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Landscape manual for administrative sites in the California region, U.S. Forest Service

L. Glenn Hall

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

REGION 5

LANDSCAPE MANUAL

FOR

ADMINISTRATIVE SITES

IN THE

CALIFORNIA REGION

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By L. GLENN HALL
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S. B. SHOW
REGIONAL FORESTER

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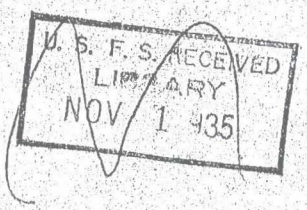

By -
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June - 1935

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Region Five

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The section on how to transplant trees and shrubs includes portions of instructions from Farmers' Bulletin No. 1591, on "Transplanting Trees and Shrubs", by F. L. Mulford, U. S. Department of Agriculture.

INTRODUCTION

This manual is intended to be a practical guide to those who are engaged in landscape improvement work on Administrative Sites in the California Region. While general development and landscape plans have been prepared, or will be made for most of the Administrative Sites, such plans are necessarily diagrammatic and often require further explanation to adapt them to actual conditions on the ground, therefore the information and advice contained in this manual may be helpful in solving some of the practical problems that may arise.

In the development of Ranger and Guard Stations and other Administrative Sites, in the California Region, there are three fundamental objectives that should be kept clearly in mind. First, to retain and express the rugged simplicity and naturalness which is symbolic of the United States Forest Service; second, to adapt buildings and other structures to the sites in such manner as will disturb existing ground conditions the least; third, to consider the cost of the maintenance of landscaping in planning and constructing any new improvements.

The term "landscape improvement" as used in the manual is intended to mean the broad development of Administrative Sites, including the adjustment of buildings and other structures to the ground, building grouping, planning roads, walks, retaining walls and planting. In brief it covers "the art of arranging land for human use, with the proper regard for attractive appearance", which is one of the definitions of landscape architecture.

In a region with such a great diversification of climate, soil, topography and vegetation as California, it is difficult to give advice on landscaping and gardening which will be applicable throughout the State. In compiling the lists of ornamental trees, shrubs and vines, Region Five has been divided into six different districts, (see Appendix L, Plant Lists, Page 47) according to climatic and other natural conditions. In using these lists one should have a knowledge of the ultimate height and spread, growing requirements (soil, moisture, exposure, et cetera) and general characteristics of the plants. Brief information is given in the lists as to average height, whether the trees, shrubs or other plants are evergreen or deciduous, native or introduced, natural habitat, and the approximate elevation belts where the plants are best adapted.

While it would be desirable to illustrate many of the points discussed in the Manual with plans and photographs, it is not practicable to include them at this time.

A. SELECTION OF SITES

Most of the District Ranger Stations in Region Five are already established, but in some cases additional land will be required for the complete development of the sites. In a few instances, it may be found advisable to abandon an old station (where the sites are inadequate) and re-locate it nearer the center of activity of the district. The tendency, in selecting sites for District Ranger Headquarters, is to locate them in or near towns or villages or on main highways where they will be more accessible to the public and also for the best interests of the Ranger and his family, where they may be conveniently situated with reference to schools and other social amenities.

Where new sites are to be acquired for District Ranger Headquarters, Guard Stations, Supervisors' Offices, Service Sites, Staff dwellings or other Administrative purposes, an investigation will be made by the Regional Office, in conjunction with the Supervisor of the Forest concerned, of the selection of the site from an administrative standpoint. After the general geographical location has been determined, other requisites which should be considered are:

1. Area needed, based on building requirements not only for present needs, but also for future administration. A preliminary plan of building grouping and other facilities (allowing ample room for future expansion) should be made before site is finally acquired.

2. Accessibility.

3. Appearance - natural setting, presence of trees and other vegetation.

4. Exposure - a southern exposure is usually best, particularly for stations at high altitudes.

5. Available water supply, for domestic and irrigation uses, and the cost of developing or paying for it (if it is obtained outside of Government land).

6. Rate of slope of ground, soil conditions and available areas for septic tanks and sewage disposal.

7. Available pasture - where pasture is necessary.

8. Topography, which should be level enough for good building sites without excessive grading or requiring high retaining walls.

9. Possible setback of buildings from main highway, if in the Forest, or from a street, if in a town. The setback of at least 200 feet from the center line of Forest Highways on the Federal Aid and State Highway systems, and 100 feet from the center line of County and community road systems should be observed. If not practicable to conform to this requirement (See L-Uses Roadside Strips, letter of Regional Forester of July 6, 1931), a complete report should accompany plans for new site developments, giving the reasons why buildings cannot be located back of the scenic strips.

10. Proximity to buildings on private property. The following policy should be observed in selecting new sites:

(a) If on Government land (forest or rural setting) with private property adjoining, new Forest Service buildings should not be closer than 200 feet to private buildings.

(b) If in a semi-rural setting (small village), buildings should not be closer than 100 feet to buildings on private land adjoining.

(c) If on lots in a town, there should be at least 50 feet between Government and private buildings. This requirement is not only for appearance, but also for fire protection. If it is not possible to comply with this policy, a report should be submitted to the Regional Forester, by the Forest Supervisor or other person responsible for investigating the suitability of sites and of preparing development plans. This report should give the reasons why the policy could not be complied with.

11. Availibility of gas and electric service.

12. Views from site.

9. Possible setback of buildings from main highway, if in the Forest, or from a street, if in a town. The setback of at least 200 feet from the center line of Forest Highways on the Federal Aid and State Highway systems, and 100 feet from the center line of County and community road systems should be observed. If not practicable to conform to this requirement (See L-Uses Roadside Strips, letter of Regional Forester of July 6, 1931), a complete report should accompany plans for new site developments, giving the reasons why buildings cannot be located back of the scenic strips.

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11. Availibility of gas and electric service.

12. Views from site.

B. LOCATION OF BUILDINGS

All new buildings to be erected on Administrative Sites must be located in accordance with the Development or Landscape Plan for each site, as approved by the Regional Office. (See letter of Regional Forester, L-Stations, O-Improvements, February 15, 1932). Any proposed changes from the approved plan must be submitted to the Regional Office for approval before work is done.

Before development plans can be made, a survey of each Administrative Site is necessary, where adequate surveys have not been made. Requests will be sent to each Forest for surveys where they are required for site development plans.

INSTRUCTIONS FOR MAKING ADMINISTRATIVE SITE SURVEYS AND MAPS

A. Property survey and map (particularly necessary where site has been purchased or otherwise acquired and where it adjoins private property). Property maps may be on a small scale of 1 inch to 50' or 100', but should be platted on atlas size sheets. Ownership of adjoining private property should be shown. Area of property (in acres or fraction of acre - except for city lots) should be put on the map.

B. Existing conditions survey. On sites approximately level it will not be necessary to take topography; where sites are very irregular or where there is very much change in elevation 1 or 2 foot contours (depending on the irregularity of the ground) should be shown. In every case the bench mark or assumed datum should be indicated or referred to on the plan.

Whether topography is taken or not all existing conditions maps should show:

1. all buildings, fences and other structures on the site;

2. all buildings on adjoining private property within 50 feet of the administrative site boundaries (location, size and type of buildings should be indicated);

3. rock outcroppings and boulder formations;

4. streams - rivers, creeks, et cetera;

5. wet, marshy areas;

6. very sandy areas;

7. all prominent trees, with the diamter 4' above ground and kind of tree;

8. groups of trees or shrubs may be shown by an outline of the edges;.

9. roads, trails and walks (show highway right-of-way lines, width of right-of-way, and width of used roadway);

10. direction and extent (angles) of best views;

11. direction of prevailing breezes in summer and cold winds in winter (where such winds would be severe enough to warrant planting of windbreaks);

12. any other data which might affect the development of the site.

NOTE: See map symbols on page 7.

C. Degree of accuracy. Property surveys should be made in accordance with instructions in the "Recreation and Special-Use Administrative Guide". Where property is purchased by the Government, property surveys should be made by qualified surveyors. Existing conditions surveys may be made with a compass and steel tape (in feet and tenths of a foot).

1. Buildings, fences and other structures and roads should be located fairly accurately with measurements to tents and bearings to 30 minutes.

2. Show actual outside dimensions of buildings unless they are new standard Forest Service structures (in which case the type should be indicated).

3. Also show distances between buildings and property boundaries and to highway (if station is near public highway).

4. If buildings are not parallel with one or more property boundaries or with a highway, bearings to buildings from a property corner or other point which can be identified on the ground should be shown. Bearings should be taken to two corners of each building.

5. In locating boulders, trees, et cetera, paced distances will be sufficiently accurate. Levels may be taken with an Abney level for contours.

D. Standard map requirements. As a rule field surveys and maps should be made on fairly heavy paper in pencil and sent to the

Regional Office. However, property maps may be traced on cloth, in the Supervisor's Office, if desired. With the exception of property maps, most of the field surveys should be platted at a scale of 1 inch to 10, 20, or 30 feet. Wherever possible, the maps should be of standard atlas size, 18 inches by 21 inches (overall), but the scale of the map should be as large as will go on the overall size of the sheet (without reference to standard title space or margins). When necessary to increase the size, in order to show the entire layout on one sheet, the drawing may be lengthened to 34 inches, still holding to the 21 inch "vertical" dimension. A 4 inch margin should be left at top of sheet, 2 inches on left hand side (for binding), and a 1/2 inch margin on the bottom and right hand side. Border lines around inside of margins may sometimes be broken where small portions of plan extend beyond.

All property, existing conditions and topographic maps of field surveys should give the following general data:

1. Title, in center of 4 inch margin at top of standard sheet, which should include name of Forest, name of Ranger District, name of Site, legal description of Site (Section, Township, Range and Meridian, State).

2. Sub-title, in left hand corner of top of sheet just above border line of 4 inch margin; letter designation of branch (as O-Improvement or L-Adjustment), name of Forest, name of Site, name of man who made survey (give initials and name - not initials only), date survey was made, name of person who platted the survey and date.

3. Magnetic declination, scale of plan, and approximate elevation (above sea level) of site, in right hand corner of top of sheet, just above border line of 4 inch margin.

4. North-point and tie to section or quarter-section corners (on property maps, where property is not sub-divided into lots).

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MAP SYMBOLS

REGION FIVE

EXISTING CONDITIONS		PROPOSED IMPROVEMENTS
	PROPERTY LINE	
	CONTOUR LINE	
	BUILDINC	
	ROAD OR WALK	
—X—X—	FENCE	—|||—|||—
	CATTLE GUARD	
—W—W—	WATER LINE	—ω—ω—
—S—S—	SANITARY SEWER LINE	—ᔕ—ᔕ—
—D—D—	DRAIN LINE	—d—d—
ϕ—E—E—ϕ	ELECTRIC LIGHT LINE	ϕ—e—e—ϕ
—EC—EC—	ELECTRIC LIGHT CONDUIT	—ec—ec—
ϕ—T—T—ϕ	TELEPHONE LINE	ϕ—t—t—ϕ
—TC—TC—	TELEPHONE CONDUIT	—tc—tc—
F	WATER FAUCET	F
V	WATER VALVE	V
S.T.	SEPTIC TANK	S.T.
W	WELL WITH PUMP	W
W	WELL WITH TANK TOWER	W
T	WATER STORACE TANK	T
	STONE WALL	
	CONCRETE WALL	
	STEPPING STONES	
	HEDGE	
	SHRUBBERY	
10" B.O. 8"S.P.	DECIDUOUS OR B.L.EVERGREEN TREE	3-1 2-3 6
	CONIFEROUS EVERGREEN TREE	

MISCELLANEOUS INDICATION

BUILDINGS (TO BE REMOVED) ROADS (TO BE ELIMINATED)

FENCES (TO BE REMOVED) FUTURE BUILDINCS

TOPOGRAPHICAL INDICATION

STREAM ROCK OUTCROPPINGS &

S SPRING BOULDER FORMATIONS

MARSH OR SWAMP VERY SANDY AREAS

NOTES

ROAD - SHOW APPROXIMATE DISTANCES TO THE NEAREST TOWNS. ϕ = POLE.

PIPE LINES - SHOW DIAMETER OF PIPE. FENCE - INDICATE WD. = WOOD WI. = WIRE

WATER TANKS - SHOW CAPACITY. STREAMS - INDICATE DIRECTION OF FLOW.

TREES - SHOW APPROXIMATE DIAMETER 4 FEET ABOVE GROUND AND KIND OF TREE.

FLWS. = FLOWERS D.F. = DRINKING FOUNTAIN F.P. = FLAGPOLE

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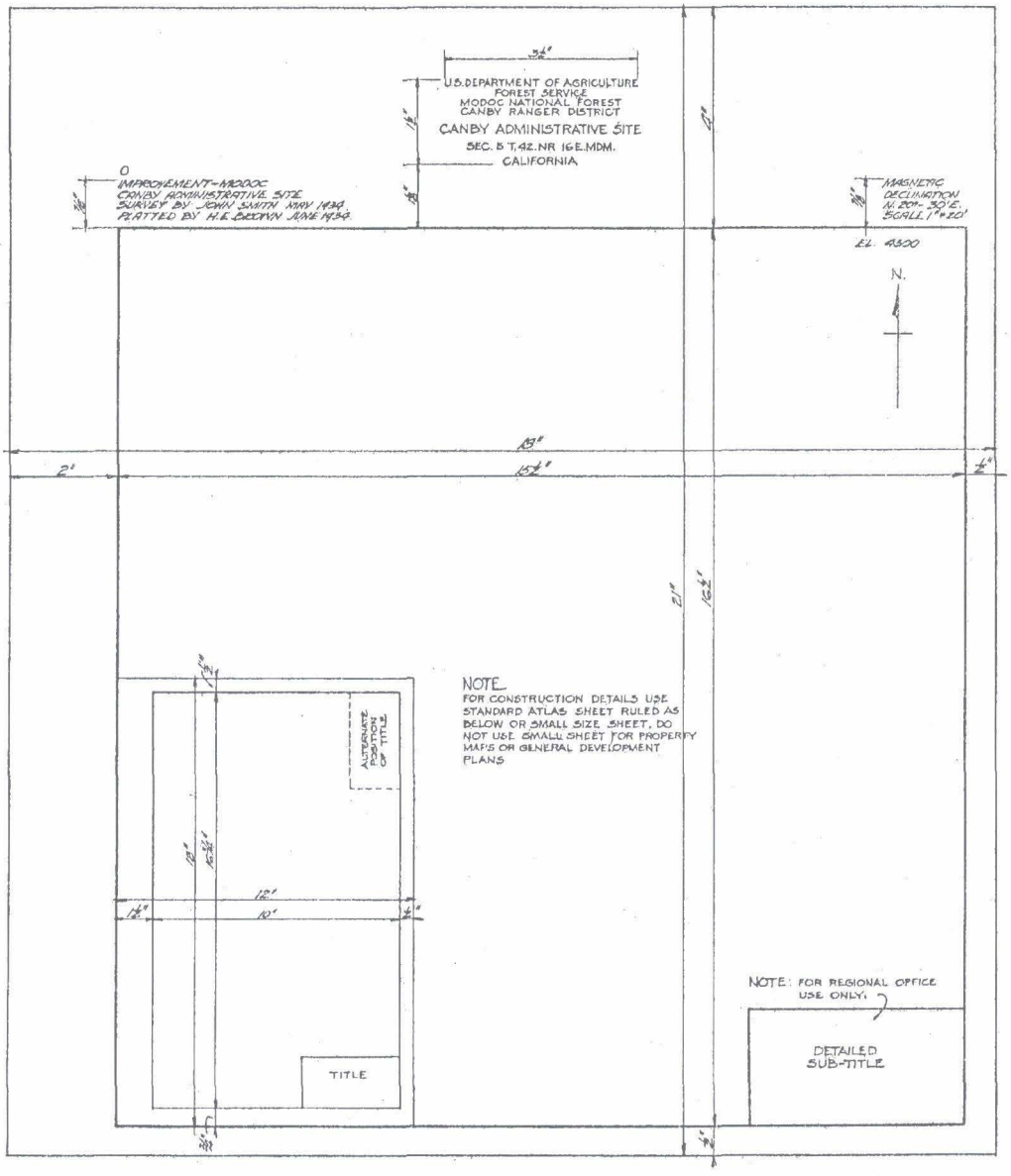
STANDARD SHEETS FOR ADMINISTRATIVE SITE MAPS AND LANDSCAPE PLANS

REGION FIVE

NOTE: IF NECESSARY TO INCREASE SIZE OF SHEET IN ORDER TO SHOW ENTIRE LAYOUT THE ATLAS SHEET MAY BE LENGHTENED TO NOT OVER 34 INCHES OVERALL.



In preparing development plans the chief factors that should be considered are:

1. Requirements of the Station or other Site:

   (a) operation;

   (b) living facilities for personnel, (both (a) and (b) determine the number and types of buildings required).

2. Adaptation of proposed buildings, together with yards, driveways and walks, to the Site:

   (a) to have as little grading as possible;

   (b) for good surface drainage;

   (c) for proper drainage for sewers;

   (d) convenience of access and use of buildings;

   (e) to make an harmonious architectural grouping;

   (f) to obtain the best views from residences and offices;

   (g) to take advantage of existing trees for shade and beauty and to avoid cutting down of good trees for the location of buildings;

   (h) orientation with reference to sunshine, snowfall in winter, shade and prevailing breezes in summer;

   (i) space major buildings at least 50 feet apart (on forest, rural and semi-rural stations) for adequate fire protection, but not spread out too much, which might be inconvenient, uneconomical and perhaps unattractive from the standpoint of building grouping.

Particular care should be taken to have the front of warehouses, at higher altitudes, face the direction (usually south, southeast or southwest) where snow and ice will thaw most rapidly in winter. At the same time all warehouses where fire trucks are kept during the fire season should be located so as to have the most direct outlet (at the easiest grade possible) to the main highway. Barns should be located as far from dwellings as possible and still not be too inconvenient. They should be placed so that prevailing breezes will not blow from the barn toward dwellings. Barns should, of course, be easy of access to pastures (where there are any). Care should be taken not to locate barns above and close to a source of water supply.

Development plans should be made on a scale of 1 inch to 10, 20 or 30 feet. For large areas it may be desirable to prepare a general plan at a scale of 1 inch to 50 feet. When a survey has been platted at a scale of 1 inch to 25 feet, the development plan should be made at the same scale. As a rule, the plans should be on standard atlas size sheets, 18 inches by 21 inches. When necessary to increase the size in order to show the entire layout on one sheet, the drawing may be lengthened to a total of 34 inches, still holding to the 21 inch "vertical" dimension. (See symbols for proposed improvements, page 8)

C. CLEARING AND GRADING

1. Saving Trees and Shrubs

In clearing a new Administrative Site, located where there are native trees and undergrowth, all trees and shrubs not in the way of proposed buildings, roads or walks should be saved.

(a) Where trees are very close to new construction work they should be protected from injury by temporary boxing around the trunks with rough lumber. An exception to the general rule of saving all good trees might be where a Ranger Station is to be built in a dense conifer forest. In such case a judicious thinning out of conifers (particularly white firs, or other less desirable trees), to let in more sunlight around the buildings is frequently desirable, but should not be done until after buildings are erected, except where certain trees could not be felled without the possibility of damaging structures.

(b) While it is better not to make any fill around the trunks of existing trees, if a fill of more than a foot has to be made, a well should be constructed around the tree with rock, keeping the rock wall at least 18 inches away from the trunk of the average mature tree.

2. Grading

(a) In grading a site the fertile top-soil should be stripped off down to the raw sub-soil and piled where it will be convenient for replacement on lawn and shrub areas. As a rule the proposed elevations given on Grading or Landscape Plans are for finished grades.

(b) Allowance should be made in grading the sub-soil as follows: Grade 6 inches to 9 inches more in depth for top-soil replacement for lawn areas and 12 inches to 18 inches for shrub and flower beds. 6 inches of settled top-soil is the minimum for lawns; 9 inches is preferable. 12 inches of top-soil is the minimum for shrubs and flowers; 18 is better.

(c) The ground should be sloped away from buildings sufficiently for good drainage, so that the finished grade (of top-soil) will be at least 4 inches below the water table of the buildings.

(d) In grading banks on grounds near buildings, straight slopes should be avoided (such as are frequently seen in cuts on

highways). Both the top and the bottom of the slope should be well rounded, - the top convex and the bottom concave.

(e) Where fills have to be made for lawn areas the loose soil should be puddled and rolled when dry, to detect uneven spots. If the fill is very deep, it is well to let the soil thoroughly settle, perhaps through a winter season, before sowing the lawn.

(f) Fertile soil that has been taken out of a bank (where it is deep) also needs to be aerated by exposure to the weather for at least two or three months before sowing grass seed.

(g) Generally speaking, a 3% grade is about the limit for a lawn. Where slopes are steeper, it is better to use shrubs or some low ground cover or vine. Sometimes the combination of a low, rock, retaining wall with a steep bank above, planted with low shrubs, will make the transition better between a considerable difference in elevation than by using a high retaining wall or a steep grass bank. High retaining walls should not be constructed unless absolutely necessary.

D. RETAINING WALLS AND TERRACES

1. Wall Materials

(a) If retaining walls are necessary they should usually be constructed of rock. The choice of the kind of rock to be used in the wall is important. If native rock is available, it usually looks better and is more economical. Flat slate rock, laid up horizontally and well bonded (without mortar) is probably the most ideal stone for low retaining walls. Sandstone or limestone is perhaps the next best. Wash (river or creek) boulders can be used for either dry (without mortar) or masonry walls, but care should be taken to lay as many rocks as possible in a horizontal manner and they should be well bonded. In naturalistic types of masonry walls, mortar between rocks should be brushed out with a wire brush in order to have as little mortar showing as possible. If the wall is built of rock, it should look like a rock wall and not resemble a cement wall with rock apparently imbedded in the face of it. A cut stone wall, of limestone or granite, can be made very attractive, but it usually takes a stone mason to do it successfully. The tops of rock walls should be made of selected stone as flat as can be obtained. If a cement coping is necessary, it should be as thin and inconspicuous as possible. A thick, straight cement coping should not be used.

(b) Brick might be used for walls in connection with the new Forest Supervisor's Office buildings.

(c) Concrete might be used instead of rock on warehouse sites not located near residences.

2. Construction

(a) All retaining walls should be constructed in a substantial manner. Walls over 4 feet high, where there is very much soil pressure, should be designed by competent engineers.

(b) A batter (slope) on the face of all walls over 2 feet high, of 1 inch to 1 foot (1 to 12) is necessary.

(c) Provision should be made for the drainage of solid masonry walls by providing weep holes near the foot of the wall. The size of the weep holes and the spacing of them will depend on the amount of drainage to be taken care of, but as a rule 3-inch holes, about 15 feet apart will be sufficient.

(d) For low walls (up to 3 feet high) a dry rock wall (laid in a substantial manner without any mortar or cement) will often look better than a masonry wall.

(e) An interesting effect may be obtained by laying the rocks so as to leave pockets or crevices and to fill them with good soil at an angle (about 45 degrees) pitching back from the face of the wall. Low native shrubs and wild flowers may be planted in the crevices. (See Plant Lists, Appendix L)

3. Terraces

A terrace means an open area, usually rectangular and adjacent to a building.

(a) There may be a retaining wall on the lower side and sometimes on the upper side of a terrace.

(b) The transition from one terrace to another may be by a slope of the ground. Such slopes are usually rather steep and are easier to maintain if planted with shrubs rather than lawn.

(c) Terraces should be approximately level and may be in lawn or if not too large, may be paved with brick or stone, with grass or small rock plants between.

E. ROADS AND WALKS

1. Location and Alignment

(a) Roads, driveways and walks around Administrative buildings should be primarily laid out for convenience. At the same time, they should fit into the landscape and should not cut up open areas too much.

(b) Where a change in direction of a road is necessary, a long, swinging curve will usually look better and will be easier to drive over than a sharp curve. A reverse curve will usually be more pleasing than making a diagonal road or walk, unless the latter fits the architectural scheme.

(c) A one-way road may be from 10 feet to 12 feet in width, depending on the kind of equipment to be used. A two-way road may be from 16 to 20 feet in width.

(d) The road should usually be crowned in the center. Where there is a large volume of water to be taken care of, rock gutters 12 to 18 inches wide and 4 to 6 inches deep may be necessary.

2. Curbs

It is often desirable to construct a rock or wooden curb (4 to 6 inches high) along driveways and around service yards, particularly where there are lawn areas adjacent.

(a) If rock curbs are built, the stone should be laid flat and not with sharp edges sticking up out of the ground.

(b) Small cedar logs or rough sawn redwood (2 inches by 6 inches, number 1, common) may be used as a curb along a road. The cedar logs should be of a uniform size, either with the bark left on or peeled and then oiled or stained brown. The redwood plank should be set on edge, flush with the lawn area and should be staked firmly in the ground.

(c) As a rule, concrete or brick curbs should not be used except for the grounds of a Forest Supervisor's Office Building or for a Ranger Station, or other Staff Buildings in a town.

3. Surfacing Roads

The question of surfacing of Station roads depends to a large degree on the material available. In some localities decomposed granite or lava rock will make a very satisfactory surface. At other places an oil-and-gravel surfacing will be the most desirable. A black-colored bitulithic surfacing is not desirable from the standpoint of appearance and neither is a concrete surfacing. To prevent dust on dirt or gravel roads calcium chloride may be applied two or three times during the summer season. Since it comes in powder form, it should not be applied on a windy day.

4. Location of Walks

(a) Walks around administrative sites should be laid out to fit the ground.

(b) They should afford convenient access to various buildings, but in no case should a walk be against the side of a building, (particularly where there is no entrance) unless along a driveway where there is very restricted room. A space of at least 3 feet should be left for shrubs or flower planting (or lawn) around the foundations of most buildings, with the exception of warehouses.

(c) In most cases walks on level ground should lead by the shortest way from one point to another unless necessary to curve around a tree, a boulder, or other obstacle.

5. Material for Walks

(a) At the majority of ranger stations in the California Region flat, native stone will look better for walks than any other material. If a slate flagstone or basalt rock is not available, other rock (even wash boulders) that are flat on one side may be used.

Cement walks should not be constructed around ranger or guard stations unless the administrative site is located in a large town.

In some cases gravel walks will be satisfactory, particularly where decomposed granite or lava rock is available. Regular pea gravel or fine crushed granite will also make a good walk.

6. Walk Construction

(a) Walks should usually be from 3 to 4 feet in width, except walks to offices, (which have long front steps) which may be from 6 to 8 feet wide, depending on the distance from

the main road (the closer to the road the buildings are, the wider the walks should be).

(b) The stone should be laid so that the different shapes will fit fairly close together, unless it is desired to have grass grow between the stones. If a firm, sand cushion about 2 inches thick, under the stones is provided, mortar joints should not be necessary.

(c) Separate stepping stones (single file walking) may be set in lawn areas for paths where there is not much traffic. They should be spaced about 22 inches from center to center. The spacing (on center) should be constant. The stones should be of a natural irregular shape (without being too angular) and from 12 to 16 inches wide and 16 to 20 inches long.

(d) As an edging for gravel walks in lawn areas, rough sawn redwood 1 inch by 4 inches (No.1, heart common) may be used, to be set on edge, flush with the lawn.

F. FENCES

Fences should not be constructed unless necessary to keep out stock or for some other physical need. Stations with a forest background will look better without fences.

1. Use of Wood

   (a) The general practice in Region Five in regard to fencing Administrative Sites is to use wood wherever possible, rather than wire. (See O-Improvement letter of Regional Forester of Nov. 7, 1932) This particularly applies to ornamental fences around Ranger Stations.

   (b) Where suitable timber is available the old fashioned rail fence may be very appropriate for Stations with a forest or country setting.

   (c) In some cases heavy woven wire may be more desirable for warehouse sites in towns.

2. Staining or Painting

   (a) Wood fences should be stained brown, where buildings are brown, except in the case of peeled poles for Type 5 fence, which may be oiled.

   (b) Where the Station buildings are white, the fences should also be white.

3. Types

   (a) (For different types of ornamental wood fences suggested for Administrative Sites see circular, O-Improvement, Fence designs, of May 21, 1934 including plans as revised January 1935.)

   (b) The types of fences to be built are usually indicated on the Landscape Plan. If plans have not been made, approval of types of fences to be constructed should be obtained from the Regional Office.

G. GARDENS AND OTHER FEATURES

1. Gardens - General

One of the essentials of a garden is that it shall have a sense of enclosure or background. While it is often desirable, it is not necessary that the enclosure be a building, wall, fence or hedge. A garden may be enclosed by a mass planting of shrubbery or trees or by the natural topography of the ground. In addition to the enclosure, on at least three sides, the formal garden usually has a major axis or center line and sometimes one or more minor or cross axes at right angles to the main axis.

A discussion of formal gardens, except in an elementary way, would not be desirable in this Manual, as the garden treatment at Ranger Stations in the California Region should be kept simple. Where administrative sites have a real forest setting, any gardening should be quite informal in character. However, many of the District Ranger Stations in the California Region do not have a forest background but are located in towns, villages, farming communities or on sage brush plains. It is therefore considered appropriate to have small flower gardens or flower borders close to the dwellings of such semi-rural stations. They should make the stations more livable and attractive. The space occupied by gardens will at the same time reduce the area devoted to lawns. The type of gardens, including the choice of plants for it, should be determined by the general character of the landscape, climatic conditions, et cetera.

In addition to small, general flower gardens, other types of gardens that may be developed by the Ranger and his family are: Rock Gardens, Rose Gardens, Perennial Gardens, Iris Gardens, Wild Flower Gardens, Cactus Gardens, et cetera. As a rule not more than two or three types of gardens should be laid out, even at large District Ranger Stations where there may be two or more dwellings. Books on special kinds of gardens are included in the reference list at the end of this Manual. A special effort should be made at each Station to avoid elaborate garden effects, which might require considerable upkeep. Since the personnel of Stations may be changed, the types of plants used should be generally those that will require the minimum amount of care, in order that the appearance of Forest Service grounds may not, at any time, be neglected.

Where Stations have a forest background, informal wild flower or rock gardens will usually be more suitable than formal types. In fact, it would be desirable if a special effort should

be made - at Ranger Stations which have a natural forest, country or mountain setting - to first, grow the native flowers and shrubs, second, the flowers or shrubs that would be most in harmony with the native plant material and at the same time be hardy. Thus each Ranger Station might become somewhat of an horticultural experiment station (on a small scale) for the particular community in which it is located. This does not mean that botanical collections should be attempted, which might spoil the landscape appearance of the station. Whatever is done in the gardening line should harmonize with the general landscape plan for the station and also with the architecture, where gardens are near buildings.

2. Arbors, Trellises and Seats

Arbors, pergolas and other special structures should not be built, unless approved by the Regional Office. Care should be taken not to have too many arbors or pergolas on one site. When they are approved, plans will be prepared by the Regional Office.

(a) Types

An arbor or pergola may be built over a walk near a house or it may be a special feature at the rear or side of a garden or lawn area. A very attractive rustic arbor can be made of California Incense Cedar with round posts (from 8 to 12 inches in diameter) and smaller cross-pieces on top. Square adzed timber, oiled or stained may be used where round cedar is not available.

Where space does not permit an arbor, a single post trellis can be made to take the place of a fence or hedge. Small trellis-work may be placed against a building for climbing roses or other vines.

A lattice or rustic arbor arching over a seat is often a pleasing feature to terminate the vista on a garden walk.

(b) Suitable Vines

Among the best hardy vines for arbors or pergolas are grape vines, Virginia Creeper (Ampelopsis quinquefolia), Clematis, Japanese honeysuckle, climbing roses and at lowland stations in Southern California, Bignonia and Jasmine may be used. (See Planting Lists for other vines.) For quick effect the annual Hop Vine (which dies down in winter) is one of the most successful.

3. Water Features

Water, in a stream, pond or pool, is most always a desirable

element in the landscape. It may add interest by the sound of running water in a brook, creek or river, or even by the dripping of a small amount of water in a pool. It may serve to reflect the landscape in a quiet stream or pool.

(a) Ample Water Supply Required

A few of the Ranger Stations in the California Region have streams running through or near the sites. Many of them are located in semi-arid sections where it is necessary to pipe gravity water from a distance or to pump it from a well. Therefore water features may be impracticable on such stations. The water supply should be ample to take care of any pools or fountains as a dry water feature looks worse than not having any feature of this kind.

(b) Location of Pools

When pools or fish ponds are constructed on Administrative Sites, they should have some definite and appropriate relation to the surrounding landscape, including buildings, fences, walls, walks, lawn spaces, trees and shrubs. Sometimes they may be located in a garden at the intersection of two or more walks, perhaps on the axis of a doorway or window of a building. The pool may be occasionally located on a lawn with stepping stones leading to it.

(c) Types of Pools

Pools should be either formal or informal in shape and appearance. Consistency with standards of good taste is one of the tests of whether anything is really artistic. Formal-shaped pools require more careful placing in relation to buildings. Sometimes round pools are made with jagged irregular rocks, often of contrasting color, sticking up around the edge and held on by mortar. One of the reasons that such pools are not successful as a work of landscape art, is because they are neither formal nor informal, but a mixture of both. As a rule formal pools should either be circular, semi-circular, oval or rectangular - not triangular nor diamond-shaped, unless there is some special architectural reason for it. Informal pools should, of course, be irregular in shape (but without sharp angles) simulating a natural pond.

(d) Material and Construction of Pools

As noted above, the edging (or coping) is very important and should conform in character with the shape of the pool (either formal or informal). A formal pool should have a finished coping - all of the part that shows above the water or ground. It may be of concrete, cut stone, or

brick. If small blocks of cut stone or brick are used they should be laid with the mortar joints on the radial lines of the pool. Unless a formal pool is definitely of the Spanish type (used in patios) the coping, including the main wall of the pool, should not be over 6 or 8 inches above the ground. They often look better flush with the ground or lawn.

An informal pool may also be flush with the ground or lawn - in fact, it may be constructed without any definite edging as long as there is a lawn or some type of planting around it. If an informal pool is to have an edging, it should be of rock, not of concrete nor of brick. The rock should be laid in a naturalistic manner. If the rock is slate, flagstone or shale, it should be laid in horizontal ledges. If they are rounded, wash boulders, then in an irregular manner, as they would be likely to occur along the bank of a natural stream or pond.

The two chief types of pools according to depth are the unplanted type, approximately 4 inches to 12 inches deep, and the planted, or lily type, at least 2 feet deep. Gold fish, mosquito fish or frogs should be kept in pools to eliminate mosquitos. Gold fish will live in either type, but they usually prefer a deeper pool. However, rocks can be placed in the bottom of an unplanted pool to give shade and shelter to fish.

The general construction of both types of pool is practically the same. Overflow and drain pipes should be provided for all pools, so that they may be drained and cleaned out when necessary.

Pools should not be constructed without the approval of the Regional Office. Where necessary, detailed plans will be prepared for the construction of pools or fountains.

(e) Aquatic Planting

A pool for lilies should have about one foot of water over the boxes of dirt where they grow. Boxes for water lilies should be about 2 feet square and 1 foot deep and should be made of redwood or else built in on the bottom of the pool with rock, brick or concrete. Wooden boxes should be set up on rocks or bricks about two inches above the bottom of the pool. Smaller boxes will be satisfactory for smaller types of aquatic plants.

Soil for water lilies should be of 1 part well-rotted manure to three parts of soil and decayed sod. Plant the lily roots horizontally, pressing in the mud about

2½ inches. Put sand on top, and fill the pool with water gradually. Hardy types of water lilies are Nymphae Odorata Minor (white miniature) and Nymphae Laydekei purpurata (rosy crimson). Other aquatic plants (which do not require very deep water) are the Water Hyacinth, Cattail (Typha latifolia), Egyptian Papyrus (of which there are two species - Cyperus papyrum and Cyperus alternifolia), Japanese Iris and the Water Snowflake (Limnenthemum indicum) fringed, with snow-white flowers. Most of these plants will only be hardy at stations in the warmer, lowland sections. They would have to be taken up and stored during the winter in colder sections.

4. Bird-baths, Bird-houses and Sun-dials

Bird-baths and sun-dials may be placed at the intersection of walks in a garden, or sometimes at the end of a walk, to terminate a vista. Bird-baths may be in the shade and in fact from a practical standpoint of inviting birds, are better in a corner of the garden or on a lawn area near shrubs. They should, however, be in the open, at least 15 feet away from shrubbery, in order to protect birds from cats.

In woodland locations a rustic sun-dial may be made with a stump or section of a log placed upright. The more formal type of sun-dial may be built of small flagstone laid horizontally, but should only be used at Ranger Stations where there is an enclosed garden or other formal area.

A few inconspicuous bird-houses or feeding perches may be placed in a corner of a garden or where there are or will be trees or shrubs. These will serve to attract birds, and in very cold locations may help, at least to some degree, (depending on how much the Ranger or his family are interested in bird-life) in the conservation of wild birds. Bird-houses should preferably be small and rustic in character. It is better to suspend them from the limbs of trees, where there are trees of a suitable type as oaks, maples, or other round-headed or picturesque trees, rather than to nail them on trees. If there are no existing trees, the houses may be placed on top of cedar posts (but in this case there should only be one or two at a station). A small wooden feeding shelf may also be placed on top of a cedar post (for winter feeding in cold locations).

H. WATER SUPPLY AND OTHER UTILITIES (With reference to landscaping)

It is not within the scope of this Manual to give detailed information in regard to water supply, sewage disposal, electric light and telephone lines, except insofar as they appear in the landscape or the landscape appearance, including location of buildings, is dependent on the proper location and timely installation of such utilities.

1. Water Supply

(a) Gravity System

The development of new planting is, at most of the Administrative Sites in the California Region, dependent on an adequate water supply. Wherever possible, a gravity system, from springs or from an uncontaminated stream, is highly desirable. Even with a gravity system it is often necessary to provide a storage tank near the station.

(b) Pumping

Where a gravity system is not feasible, it will probably be necessary to pump water from a spring, a well, or a stream. A pump house is usually required over the well and sometimes an elevated storage tank. The Regional Office will furnish plans for pump houses and for the framework for tank towers. Since such towers are more apt to mar the appearance of the Station, rather than to improve it, the towers should be placed in an inconspicuous place if possible. If not possible, perhaps they can be screened by trees.

All water pipes on Station grounds should be placed underground (below frost line in higher altitudes) before any lawn, trees or shrubs are planted.

For detailed information on water developments, see "Small Water Developments Handbook", Forest Service, Washington, D. C., 1935.

2. Sewage Disposal

The main questions about sewage disposal as related to the selection of sites, location of buildings, grading and landscaping are:

(a) Location of septic tank.

The septic tank should be fairly close to the building or buildings it serves, but its location is often determined by the area available for the sub-surface disposal system and of course, by the rate of ground slope from the building.

(b) Sufficient slope from plumbing fixtures to septic tank.

The fall of the sewer pipe from the plumbing fixtures to the septic tank should be not less than 1/4 inch per foot.

(c) Area required for sub-surface disposal system from septic tank.

The area required for the sub-surface drainage disposal system will depend on soil conditions and the size of the septic tank, which is determined by the number of persons on the site. Septic tanks are usually built of concrete or redwood. According to Circular No. 82, "A Septic Tank for Farm Homes" by the Agricultural Extension Service of the University of California:

The net capacity (of a septic tank) should equal at least twice the amount of water used daily in the home. Since the amount averages from 20 to 40 gallons per day per person, for a two-day minimum retention period the septic tank should have a capacity of at least 40 to 50 gallons ($5\frac{1}{2}$ to 11 cubic feet) per person. The minimum size tank for 4 to 7 persons would be 3 feet wide by 7 feet long by 4 feet deep. Where a redwood septic tank is installed the distribution system will probably be through inverted V-troughs of redwood. There should be 10 feet of trough per person, up to 100 feet. If additional distribution is needed branch lines should be installed, about 8 to 12 feet apart. If the soil is heavy the troughs should be laid in 12 to 18 inches of loose rock or gravel, on a slope of 1 inch to 10 feet. Where a concrete tank is installed the distribution system will probably be through ordinary (porous) drain tile. Since there should not be over 3 branch lines from 1 tank, the maximum area required for a sub-surface disposal system would be about 50 feet by 120 feet or 6,000 square feet. The minimum area, for a septic tank for 4 to 7 persons would be about 30 feet by 80 feet or 2,400 square feet.

(d) Location of sub-surface disposal system in relation to sources of water supply.

The location of a sub-surface sewage disposal system in relation to water wells or springs depends on the depth of

the highest ground water table below the sub-surface system. For sandy soil the following distances should be observed, from the outer limits of the disposal system to the source of water supply: minimum of 50 feet for depth of 10 feet to water table;

minimum of 120 feet for depth of 2 feet to water table.

(e) Use of effluent for sub-irrigation.

The effluent from a sub-surface sewage disposal system may be used for sub-irrigating alfalfa, berries or trees, but not for vegetables which may be eaten raw. Trees should not be planted within the area of the underground distribution system, but may be planted near the outer limits.

(f) Cleaning septic tanks.

Since septic tanks do not require cleaning oftener than every three years for 6 persons on the site, and every six years for 3 persons, the ground over the top may be seeded in lawn (and the sod cut out and replaced when necessary to open the tank) or the ground may be cultivated, if in a shrub bed.

For further information on septic tanks and rural sanitation, see:

"A Septic Tank for Farm Homes", by H. L. Belton and J. P. Fairbank, Circular 82, Agricultural Extension Service, University of California, Dec. 1933.

"Rural Sanitation", Special Bulletin No. 47, Department of Public Health, State of California, by C. G. Gillespie, Chief, Bureau of Sanitary Engineering, June, 1929.

3. Light and Telephone Lines

At District Ranger Stations and other prominent administrative sites, overhead light and telephone lines in the vicinity of buildings should be put underground in cable or conduit wherever practicable.

On sites where lighting plants are installed, the plants should be centrally located for convenience and economy, provided they can also be placed in a building with other facilities, such as a pump or tank house, a warehouse or garage.

I. SPRINKLING SYSTEMS

For watering lawns around buildings on Administrative Sites some type of automatic sprinkling system will not only reduce the cost of maintenance considerably but will also conserve water and keep the lawn in better condition than watering by hand, with a hose. In some portions of California, watering is required almost the year round. The question of what type of system to install should be taken up with the Regional Office. The amount of water piping and the type of sprinkling system should be determined, and all pipe laid, before going ahead with the development of lawns.

The choice of the system depends on the water pressure, the size of the area, how many trees and shrubs are in the lawn, the slope of the ground, soil conditions, the cost of water by gravity, irrigation or by pumping, and the funds available. For large, unobstructed lawns revolving sprinklers, either with or without hose, may be used. Such sprinklers will cover a diameter of 100 feet on a nozzle pressure of 35 pounds. They may be attached to concealed valves (flush with the ground) which will eliminate the use of hose. A similar type of sprinkler may be used with hose from an ordinary water faucet.

For small lawn areas, where there is sufficient water pressure, the automatic, concealed sprinkling system is the most satisfactory. The spacing of the sprinkler heads varies from 10 to 18 feet, depending on the static water pressure. The number of heads that may be placed on one line has to be calculated from the water pressure, the length and the size of pipe used.

The manufacturers of lawn sprinkling equipment will prepare plans for sprinkling systems, without charge, if a plan of the grounds is submitted to them. The landscape or planting plan, showing all existing and proposed buildings, fences, roads, walks, lawn areas, trees and shrubs, is the best type of plan to submit. Prints of such plans may be sent out with the call for bids, requesting each firm to submit a sprinkling plan with their bid. Other information that should be given to the manufacturer is:

1. Water pressure.

2. Location and size of meter (if any).

3. Location and size of water supply line.

4. If an elevated tank is used give:

   (a) Capacity of tank.

   (b) Pump capacity in gallons per minute.

(c) Distance from bottom of tank to ground.

(d) Size and length of pipe leading from tank to area which is to be sprinkled.

(e) Difference in elevation between point at which tank is located and area to be sprinkled.

It should be stipulated in the request for bids that all pipe will be furnished and the system installed by the Forest Service. This procedure with reference to sprinkling systems will not only save the Forests a lot of drafting and office work, but will insure that the system accepted will operate satisfactorily, since it should be specified in the call for bids that the manufacturer shall guarantee that his equipment will cover the grounds adequately according to his plan, provided that the water pressure and other factors have been accurately gauged and that the system has been properly installed.

The following list of manufacturers of lawn sprinkling equipment is given for ready reference, but should not be taken to mean that the Regional Office recommends any particular firm, as bids should be called for in the regular manner:

Brooks Sprinkling Systems,
1277 Mission Street, San Francisco, California

Buckner Manufacturing Company,
1615 Blackstone Avenue, Fresno, California

Atlas Lawn Sprinkler Co.
(Local representative of Buckner Manufacturing Company)
981 Folsom Street, San Francisco, California

Hill Sprinkler Company,
1406 W. Slauson Avenue, Los Angeles, California

G. E. Moody,
1579 Riverside Boulevard, Los Angeles, California

Thompson Manufacturing Company,
2251 East Seventh Street, Los Angeles, California.

J. LAWNS

Lawns are very desirable around the offices and living quarters of Ranger Stations, particularly at year round stations without a forest background. A lawn not only forms an important part of the landscape setting, tending to give a sense of spaciousness to grounds and also to unifying trees, shrubs and buildings into a complete picture, but it also has a practical value in cooling the atmosphere in summer and making the station more livable.

1. Restricting Lawn Areas

While lawns are desirable the station grounds should be not laid out with a larger lawn than can reasonably be taken care of, both as to water supply and to maintenance. In some locations part of the grounds may be sown with a natural short grass, which may be occasionally mown with a scythe, but will not require short clipping with a lawn mower. In other cases a ground cover may be used as a substitute for a lawn. (See Planting Lists for Ground Cover).

2. Farmer's Bulletins on Lawns

Every District Ranger and everyone in charge of landscaping Forest Service Administrative Sites should have a copy of U. S. Department of Agriculture Farmer's Bulletin No. 1677 on the "Planting and Care of Lawns" by H. L. Westover and C. R. Enlow, of the Bureau of Plant Industry. It was issued October, 1931 (price 5 cents). For control methods for moles in lawns see Farmer's Bulletin No. 1247.

3. Preparation of Soil

Climatic conditions vary so much in the California Region that one standard for planting and care of lawns over the whole Region will not be satisfactory. However, the preparation of the soil is essentially the same throughout the Region. The majority of the California Ranger Stations are located where there is ample drainage.

(a) Where stations are located on meadow land sub-surface drainage by agricultural tile may be required.

(b) There should be good surface drainage in order that pockets will not be left for water to stand in.

(c) The ground should be rolled when dry after being brought up to the final grade.

(d) Fill good garden loam on top of the raw sub-soil to a depth of at least 6 inches (9 inches is better).

(e) If good top-soil is not available, well-rotten barn-yard manure may be worked into the existing soil, or a commercial fertilizer such as cottonseed, blood or bone meal may be used at the rate of about 25 pounds per 1000 square feet. It should be thoroughly mixed with the soil.

4. Sowing Grass Seed

(a) In most cases one pound of grass seed will sow 150 square feet. Some grasses with fine seeds such as Red Top and Bent will sow from 300 to 350 square feet. If the weather is warm and the lawn is in open sun, a light top dressing of screened dairy manure, peat mixed with fine soil, or sawdust is desirable right after sowing and raking in the seed. The surface of the ground should be kept fairly moist by light sprinkling until the seeds germinate and the grass has become rooted. Keep weeds out.

(b) In the dryer portions of California a lawn mixture of Kentucky Blue Grass (70%) Redtop (20%) and White Clover (10%) by weight will usually make a satisfactory lawn in the open.

(c) In the Coast Range Mountains of California, north of San Francisco, where the soil is inclined to be more acid than alkali, a combination of Seaside Bent (70%), Chewings Fescue (20%) and Redtop (10%) will usually make a good lawn. One of the best shade grass mixtures is Poa trivialis mixed with about 15% Chewings Fescue.

(d) In Southern California Bermuda or St. Augustine grass will often make the most practicable lawn. St. Augustine grass will grow in either sun or shade. It is not hardy at high elevations, however, (probably not over 1,500 feet in Southern California). Bermuda grass may be sown from seed or grown from stolons (runners), but St. Augustine grass is grown entirely by the stolon or vegetative method. Another good combination that will insure a green lawn all winter in the milder sections of Southern California, particularly on sandy soil, is composed of Dwarf Meadow Fescue (75%), Redtop (15%), Australian or Pacey's Rye (10%).

K. PLANTING

1. General Design

The planting of ornamental trees and shrubs on Forest Service Administrative Sites should be done from two main standpoints:

First, to enhance the general appearance of the site as it appears to public view as an area owned and maintained by the United States Government.

Second, to increase the comfort and livability of the site for the personnel of the Forest Service.

There should not be any conflict between these two standpoints, but sometimes the first standpoint has been overlooked by bringing out too many personal ideas in planting, rock-work, fish-ponds, et cetera. While this might not be objectionable around one's own home, where one is free to express his personal tastes as he sees fit, the landscaping of Government areas should conform to a recognized standard of landscape architecture.

In preparing landscape plans for Administrative Sites in the California Region, the endeavor has been to provide definite places around Stations for flower and vegetable gardens, fruit trees, arbors, trellises, pools, seats and other landscape features, whenever they are appropriate and desirable. These features are usually placed at the side or in the rear of a house, leaving the front for an open lawn (where lawns are practicable) bordered with shrubbery and trees. However, there may be some stations where trellises, pools, seats or other features may be suitable in front. Flowers may be planted in front of or in between the shrubs around the foundations of the buildings, as a border around the edges of the lawn, or in a special garden. Neither flower beds nor shrubs should be placed in the center of an open lawn.

Summary of Grounds

The grounds of District Ranger Stations may be divided into the following main units:

(a) The front or approach, which includes area in front of office building and dwellings and sometimes an automobile parking space.

(b) Side yards of office and dwellings. A flower garden is sometimes located on one side of or between two dwellings.

(c) Rear of office and dwellings. In the case of dwellings the rear is often divided into two units; the garden or outdoor living room area - sometimes a patio or court may be on the rear; the service area in connection with woodshed or the new type of three-purpose service building, which would include laundry yard and wood yard. The laundry should preferably be taken care of by a revolving clothes dryer, instead of having posts with wire or rope stretched between. The laundry yard may be in lawn or graveled.

(d) Orchard and vegetable garden. A place for a few fruit trees and a vegetable garden usually works in best somewhere between the rear of the house and the garage (or three-purpose building). Where there is sufficient room it should be definitely planned as a unit of the grounds.

(e) Warehouse service yard. This is usually a large graveled area, at least 35 feet wide in front of warehouses. Ample space should be allowed for parking cars - temporarily during the day in the yard. The yard should be well drained.

(f) Corral, which should, of course, be located near the barn, and well drained.

Planting Composition

In preparing planting plans the following essentials of planting composition should be observed:

(a) Study proposed planting in elevation as well as in plan.

(b) Carefully consider and visualize the ultimate height and spread of the tree, shrub or other plant. Avoid overplanting.

(c) Locate plants near buildings to fit the architecture. Place low plants under windows and higher shrubs in front of wall spaces and at corners. Use large rounded or irregular shaped shrubs at corners to soften the sharp vertical line of the building. Do not plant accent shrubs or trees (columnar or pyramidal shapes) close to corners, as they will tend to accent the sharpness of the corner, rather than to soften it.

(d) Where there are high concrete foundations, a mass planting of shrubs may be used to hide the concrete, but avoid a continuous shrub planting (particularly of the same height of shrubs) around a building with floor level near the ground. Sometimes the lawn may extend up to the building

at intervals, particularly under windows or flowers may be planted under windows.

(e) Consider the texture and color of plant foliage, also form, habit of growth and color of blossoms in arranging plants.

(f) Group plants according to their natural plant association (ecology) wherever possible, which often means the domination of one type of tree or shrub.

(g) In grouping plants avoid planting in straight rows unless called for by the architecture or a formal layout. Group two or three shrubs of one type together. Do not use too many different species. Keep planting simple. Remember that appropriate repetition has a unifying effect on the landscape picture, but if overdone it may become monotonous.

The landscape plans are made for the ultimate development of the sites and need not all be put into effect at one time. It would, however, be desirable, on Administrative Sites where there are very few trees, to get new trees started as fast as practicable.

2. Choice of Plants

The trees and shrubs shown on planting plans for Administrative Sites should be selected on the following basis:

(a) Those that are native to the locality.

(b) To be in harmony with native trees and shrubs (if any).

(c) To be hardy for the location.

(d) To give shade and at the same time make the grounds attractive.

(e) To harmonize with the architecture of buildings.

(f) Availability of plants (some plants are desirable but either are difficult to transplant from their native location, or they are not usually carried in stock by nurseries).

(g) Adaptation and suitability of plants.

Over fifty per cent of the District Ranger Stations in the California Region are located in agricultural or grazing areas or in small villages. Some of these stations are on sage brush plains or on high plateaus in the northeastern portion of the Region where there are severe winters, which make it difficult to grow any native trees, other than conifers. There are more isolated Guard Stations with a forest background than District Ranger

Stations. Where stations have a forest setting, native trees and shrubs should be largely used, particularly in the front or public portion.

When stations are to be occupied the year round, it is often desirable to plant some flowering or attractive-berried shrubs near the houses to give a greater succession of bloom and ornamental fruit than would be possible with strict adherence to native plants. However, in such cases the nursery stock should harmonize in foliage and general characteristics with native trees and shrubs.

In some localities, away from a real forest background, it is desirable to plant deciduous trees of fairly rapid growth to give shade during the hot summers. Better results can often be obtained with good nursery stock (introduced trees) rather than to attempt the transplanting of native trees from a considerably higher or lower elevation. With the exception of sycamores, black walnuts, cottonwoods and willows, most of the native deciduous and broad-leaved evergreens are rather slow in growth. This is particularly true of the oaks, both evergreen and deciduous.

In planting native shrubs and flowers, care should be taken that only those that will thrive with considerable moisture should be planted on a lawn or near a house where they will receive regular artificial watering. A large majority of the native shrubs and wild flowers, especially evergreen shrubs, grow best in comparatively dry locations. The Fremontia, with its beautiful yellow flowers, is an example of an evergreen shrub that will not stand too much watering. For the reason just mentioned, it is usually better to use a larger percentage of introduced shrubs around the foundations of buildings than of native. Most of the native plants will thrive best away from the buildings, perhaps on the outer edges of the lawn or yard. It should be noted that plants referred to in the lists in the back of this Manual as "native" means native of some portion of California, but not necessarily native of every elevation belt where they are listed. Many of them have a wide range if given some artificial watering until established.

The types of dwarf, formal-shaped conifers (nursery stock) used in towns and cities, do not, as a rule, fit in well with a country or forest setting. A few of them are listed, primarily for use around the entrances to Supervisors' Office buildings located in towns, or for Staff dwellings in towns or cities.

(See lists of Trees, Shrubs and Vines, Appendix L)

3. Flowers - Annuals and Perennials

The growing of flowers at the Ranger Stations in California Region will depend on the interest manifested by the Ranger and his family or other Forest Service personnel living on Administrative Sites. In some cases, where there is a limited water supply, it may not be practicable to grow cultivated flowers. However, wild flowers may be grown with the natural rainfall.

The kind of flowers that may be grown is usually a matter of personal taste and of one's knowledge of them. However, there are certain fundamental principles relative to flower growing which may be helpful.

(a) Fundamentals of Flower Composition

First, determination of what kind of flowers are best suited to soil and climatic conditions, either by personal observation in the community, from books or by experience.

Second, selection of flowers for different exposure, i.e. in full sun, partial shade, full shade, in open or in shelter of buildings, et cetera.

Third, fitness of kinds of flowers to architectural and to general landscape character, which includes the consideration of color of flowers in relation to color of buildings.

Fourth, grouping of flowers according to height with the tallest flowers in back of border or bed, medium height flowers, in the center and low, dwarf types in front. They should not be in straight rows and occasionally some of the medium height flowers may be planted in the front of the border, while some of the taller ones may be used for accents.

Fifth, planting of flowers according to harmony of type, i.e. Calla Lilies and Baby's Breath (Gypsophila) are quite different in flower, foliage and stems, while such plants as Amaryllis, Begonias, Day Lilies, Iris or Foxglove would be in harmony with Calla Lilies as long as colors were harmonious.

Sixth, Color harmony. By color harmony is not meant that flowers must always blend by gradual transition, which might become monotonous, but rather that colors should be selected that do not clash. For example, brilliant shades of red in most flowers do not harmonize well with delicate pastel shades of pink. Bright shades of reddish purple, such as some of the Bougainvillea vines or Ice plants, do not blend successfully with light blue or pink flowers.

White flowers may be used to make the transition between contrasting colors.

Seventh, selection of flowers for succession of bloom. This is probably one of the most difficult ideals to attain as it involves an intimate knowledge of the flowers, blooming times and length of blooming season. It is influenced too by the weather or season.

After flower beds or borders have been planned, the next question is the preparation of the soil, then seeding or planting, watering and cultivating, protecting from insect pests, et cetera.

(b) Soil Preparation

Soil for seed beds or boxes should be screened, sandy loam with several inches of porous material, such as broken clay flower pots, in the bottom for drainage.

The soil for flower beds should have more humus in it and less sand than for seed beds. Dry sheep or poultry manure is very good for flower beds. Plants require about 14 chemical elements but the 3 most essential are nitrogen, potash and phosphorus.

Their relative importance is in the order named. Nitrogen is supposed to contribute most to foliage and flower growth through such fertilizers as stable manure, sulphate of ammonia or nitrate of soda. Phosphorus makes root growth and strong stems through such fertilizers as bone meal. Potash or potassium maintains a proper balance between nitrogen and phosphorus and contributes to steady plant growth through such fertilizers as wood ashes, muriate or sulphate of potash.

Most perennials prefer a neutral soil but some plants such as trilliums, ferns and the heath family prefer an acid soil.

(c) Propagating Flowers

Most of the California wild flowers are grown more successfully from seed than any other way. Many of the cultivated annuals and some perennials, may be grown from seed when sown in the same place where they are to be grown, but the seed of most perennials should be sown in a seed bed or cold frame.

Some perennials may be grown from cuttings or slips as rock cress, cerastium, chrysanthemum, helenium, heuchera, hollyhock, delphinium, pensteman, phlox, dianthus, sedum,

veronica, et cetera. However, the cuttings should usually be started in a cold frame or seed bed and transplanted later to their permanent locations. Certain perennials may be grown best from root cuttings, as poppies, anchusa, gypsophila, Japanese wind flower (anemone) and perennial phlox. For the best time to propagate flowers in California see "Gardening in California" by John McLaren, Superintendent of Golden Gate Park, "Gardening in California" by Sidney B. Mitchell, the "Western Garden Guide" and "Sunset Garden Book", published by Sunset Magazine.

The growing and cultivation of flowers is covered more completely by books and pamphlets than some other phases of landscape work (see Reference List in back of Manual) therefore detailed information as to special treatment required for roses, rock plants, bulbs, wild flowers, cactus, et cetera, will not be given here, but brief lists are given of the most common annuals and perennials, both cultivated and wild. Space does not permit of giving complete information as to color of flowers, blooming time, et cetera. However, approximate heights of flowers are given and exposure where plants thrive best is indicated.

(See Lists of Cultivated and Wild Flowers, Appendix L)

4. Transplanting Native Trees and Shrubs

(a) Transplanting native trees and shrubs in California can be done successfully with most of the native trees and shrubs on the preceding lists, provided the proper care is taken. The most important points for successful transplanting are:

First, Moving at the proper season: Deciduous plants while dormant; evergreens in the early Spring or late Fall when the ground is sufficiently warm and full of natural moisture to stimulate the plant to the immediate formation of roots.

Second, Proper digging: Dormant deciduous plants to be dug with a minimum of injury to the roots, but without soil (bare roots); evergreens with a ball (or box) of earth about the roots.

Third, Well-protected roots: that is, covered immediately and kept moist, and the ball (of earth) if any, unbroken and moist.

Fourth, An adequate hole: (for re-planting), wider and deeper than the spread of the roots.

Fifth, Suitable soil: as to moisture, texture and fer-

tility and depth.

Sixth, Proper planting: Set at the depth at which it formerly grew, with the roots well spread (if bare root) and the soil to be brought into close contact with the roots.

Seventh, Top pruning, to balance the loss of roots or other injury when necessary.

Eighth, Maintenance of adequate soil moisture until the plant is reestablished.

(b) Root Pruning

In moving native plants it is usually better to select small plants, which are growing as single specimens. The tendency of many trees and shrubs in their natural state is to have long or wide spreading roots unless they have tap roots only. Larger deciduous trees and shrubs can be moved by root-pruning about half of the root system circumference at a distance of 2 or 3 feet from the tree by digging a trench in three or four sections at intervals around the circumference (leaving part of the roots uncut). This should be done at least six months before the tree is to be moved and a year is better. The trench should be refilled with good soil after the roots are cut, to encourage the formation of new feeding roots. Root pruning should be done in the early spring just before new root growth starts.

(c) Time to Transplant

In the California Region the best time to transplant deciduous trees and shrubs in the coastal and foothill sections, probably up to about elevation 3,000, is soon after the plants become dormant, which is usually in the late fall or early winter. In higher elevations, including northeastern California, it is usually better to transplant deciduous plants early in the Spring when the frost is just out of the ground. They should usually be top pruned before moving, to compensate for the loss of roots. Spring blooming deciduous trees and shrubs may be moved soon after they finish blooming.

(d) Care in Transporting Plants

In moving deciduous trees and shrubs it is advisable to cover the bare roots with wet burlap until they are planted or temporarily "heeled in" in the ground. The plants should be kept out of the sun and planted as soon as possible. Evergreen trees and shrubs (and particu-

larly conifers) must be moved with a ball of earth, unbroken, and tightly wrapped in burlap around the roots.

In the fog belts along the coast, broad-leaved evergreens may be transplanted almost at any time in the year (except during very hot weather) but preferably right after they have finished blooming. This will usually be in the early fall, just before the rainy season.

Coniferous evergreens will usually thrive better if moved in the spring, fall or winter. It is often advisable to do some top-pruning of broad-leaved evergreens and to thin out any sucker growth before moving. Conifers should not be top-pruned at all. The pruning should be done so as to preserve the characteristic shape of the plant.

Do not try to take a bigger ball of earth around the plant than necessary, but enough to obtain most of the major roots. After the hole has been dug around the plant at sufficient distance out from the main stem or trunk, firmly tie burlap around and under the ball with heavy twine. If the soil is firm and compact the burlap should be carefully removed, without disturbing the roots, when planting. If the soil is loose, cut the twine and leave the burlap in the hole.

Keep balled plants in the shade and out of the wind from the time they are balled until planted. The balls should be sprinkled gradually and kept moistened until planted, but not wet enough to loosen the dirt around the roots.

DO NOT PICK UP BALLED PLANTS BY THE STEMS OR BRANCHES. The plants should be lifted and handled from the bottom of the ball. They can be slid on planks on an incline out of the holes (if too heavy to be lifted directly) and into the holes where they are to go.

(e) Preparation of Holes

It is best to prepare the holes for plants before they are dug up and moved.

A hole, 3 feet in diameter and 3 feet deep should be dug for the average tree, 1 inch to 2½ inches caliper of stem and 5 to 10 feet high. Some trees with wide-spreading root systems may require larger holes.

All poor sub-soil should be removed and the hole refilled with good topsoil up to the required level for the bottom of the roots or ball. Trees should be planted to the same depth as where they were formerly growing.

The soil should be thoroughly tamped around the roots and plenty of water applied slowly immediately after planting.

The same procedure applies to planting shrubs, except that the holes may not have to be so large.

(f) Growing Plants in Containers

Another method of transplanting young evergreen trees (not over 2 feet high) and shrubs is by putting the plants directly in gallon cans (which have the lower half coated on the outside with asphaltic paint). The plants should be put in the cans with as much of the original soil undisturbed as possible. It may be necessary to add some fine rich soil with a small amount of sand. The cans should, of course, have several holes punched in the side near the bottom to permit water to drain out. They should be kept in a partially shaded area until reestablished. Plants should stay in the cans at least six months and a year is better, but not over two years in any case.

(g) Moving Large Trees

Large evergreen trees, such as Live Oaks, can be moved by constructing a square box around the undisturbed roots and earth. The size of the box will depend on the size of the tree, but for the average Live Oak with a trunk diameter of 6 to 8 inches and a height of not over 20 feet, a box 3 feet square at the top, 2 feet and 6 inches square at the bottom and 3 feet deep should be large enough.

The simplest equipment for moving boxed trees is 2 or 4 jacks, block and tackle, 4 pipe rollers about 6 inches longer on each side than the box, some heavy plank to roll the box up an inclined bank out of the hole and into the hole where the tree is to be planted.

Small trees can be slid up on to a truck, but of course, large ones will require a low-body truck, a stone boat or a dolly.

It is not necessary to do very much top-pruning of broad-leaved evergreen trees to be boxed, other than to remove dead wood.

After trees are reset they should be guyed with wire to heavy stakes or logs buried in the ground. The wire bracing should be left on until the tree is thoroughly established.

An ample basin for watering should be made around the tree after it is planted. If the weather is very dry when the tree is moved, it is often advisable to spray the foliage several times a day, soon after planting, to reduce transpiration. A burlap screen on the windward side will also help to reduce transpiration.

5. Planting Nursery Stock

Practically the same directions apply to planting bare root, balled or boxed nursery stock as to transplanting native trees and shrubs. However, deciduous nursery stock may require more top-pruning, right after planting. Cans should be removed from evergreen stock by cutting with tin shears on two sides and at the same time keeping the soil intact.

Trees over 3 feet high will require a heavy stake (preferably a 2-inch by 2-inch rough sawn redwood stake of suitable height for the tree). The tree may be fastened to the stake with strips of burlap, fixed in a figure eight so that the tree will not rub against the stake. For more permanent fastening, old rubber hose, with wire inside may be used.

In buying nursery stock in containers (cans, pots or boxes) careful inspection should be made to see that they are not rooted through the bottom of the containers, which would indicate that they were held too long in the same containers and are probably root-bound.

For the purpose of estimating the cost of nursery stock the following approximate prices are given:

(a) The average price of deciduous trees (bare root) 6 to 8 feet high is $1.00 each, and of deciduous shrubs (bare root) 2 to 3 feet high is 60 cents each.

(b) Broad-leaved evergreen trees 3 to 4 feet high, in one-gallon cans will cost about 50 cents and in five-gallon cans, 5 to 8 feet high, about $1.50.

(c) Coniferous evergreen trees are usually balled and the cost varies considerably according to size and type, but is usually from 50 per cent to one hundred per cent higher than broad-leaved evergreens.

(d) Broad-leaved evergreen shrubs in one-gallon cans will be about 50 cents each and in five-gallon cans $1.25 each.

These are list prices for single plants. There is usually a reduction for ten or more plants of one kind and greater reductions for larger quantities. In addition there should be a regular trade discount to the Forest Service of twenty to

twenty-five per cent.

6. Care of Ornamental Trees and Shrubs

The proper care of ornamental trees and shrubs may be summed up under the following main headings: Watering, Cultivating, Pruning and Protecting.

(a) Watering

During the dry season in the lowlands and foothills in California, young trees should be watered at least every two weeks in a basin from 2 to 4 feet in diameter and 4 to 10 inches deep. During extremely hot weather watering once a week or oftener may be necessary.

It is better to give the ground a good soaking around the tree (but not enough to wash the soil away from the roots) rather than light sprinkling. Of course, where trees are in a lawn area watered by automatic sprinklers they should get sufficient water when the lawn is watered.

In very hot, dry locations trees may be sub-irrigated by putting a length or two of 4 inch sewer pipe (clay or concrete) at an angle of about 60 degrees in the ground where the water will reach most of the tree roots. If bell-end pipe is used a round wooden plug may be inserted in the top end, practically flush with the ground.

Cultivated shrubs should be watered once a week during the dry season if the ground is thoroughly soaked or twice a week for lighter sprinkling. Most native shrubs will not require much water after becoming established.

(b) Cultivating

The amount of cultivation required depends on soil and moisture conditions, but of course the ground around trees and shrubs should be kept loose enough so that it will not bake. Trees planted in lawns should have a circle around them 2 to 3 feet in diameter for cultivation.

For fertilizing, well-rotted and screened cow or sheep manure worked into the soil is better than most commercial fertilizers. However, steamed bone meal is very good for trees and shrubs. For very heavy or very light soils peat moss may be used to improve drainage or to retain moisture.

(c) Pruning

Pruning is done, first, to promote the growth of the tree or shrub, second, to improve its appearance and quality or quantity of fruit or flowers, and third, to obtain a special shape (such as a trimmed hedge). Top-pruning to balance the loss of roots in transplanting has already been considered.

Pruning to help the plant growth consists of: removing dead wood; cutting out sucker growth; spur pruning of lower branches of young trees to strengthen the main trunk or leader; thinning to make stronger branches or twigs. Such pruning will help the appearance of the tree or shrub to some extent.

Pruning specifically to improve appearance consists of: cutting back new growth and general re-shaping to maintain the characteristic shape of the plant; pruning for greater flower or fruit effect and less foliage; thinning out dense trees to obtain better views.

Except for certain types of very formal evergreens or for hedges, trees and shrubs should not be sheared straight across the top or closely rounded. Such practice, of cutting off all branches evenly, tends to produce what are called "stag-ends". Briefly stated, it is better to prune from the lower portions of branches rather than the top. This is particularly true of bushy shrubs. Care should be taken not to do too much pruning.

When to Prune

In California ornamental deciduous trees should be pruned during the dormant period in the fall or winter. Evergreen trees may be pruned almost any time, but usually early in the spring or in the early fall. Any limbs cut off over 2 inches in diameter should have the cut ends painted with asphaltic paint.

Large limbs should be sawed off flush with the main trunk or with the chief direction of main limbs. Three saw cuts should be made, the first about halfway through on the under side of the limb, from three inches to one foot from the main trunk; the second on the upper side a little farther from the trunk and the last cut to saw off the stub flush with the trunk.

In pruning deciduous flowering shrubs the best time for pruning depends on whether it is a spring or summer blooming plant. Spring blooming shrubs (and fruit trees) should be pruned in late summer or early fall, after the

blooming period. This class includes Eastern lilac, forsythia, wisteria, spirea, virburnum, weigela, deutzia, et cetera.

Evergreen shrubs should be pruned immediately after the flowering season.

Summer-blooming shrubs which produce flowers on new shoots that grow early the same season, should be pruned in the winter or very early spring. This class includes grapes, quince, hybrid perpetual roses, shrub hibiscus, crepe myrtle, mock oranges, hydrangea, et cetera.

(d) Protection

The protection of woody trees and shrubs may be divided into protecting from: sun-scald and wind; animals; insects and diseases. Trees should be properly staked or have a burlap screen on the windward side, as long as needed, as already described under the heading of "Nursery Stock". To protect against sun-scald in exposed locations the tree trunk may be white-washed or temporarily wrapped with burlap or tar paper. However, it is better not to plant trees and shrubs that are sensitive to wind damage in wind-exposed places.

The chief damage to young trees from animals is from gophers and perhaps from rabbits, squirrels and deer in some localities. If gophers are very numerous the tree should be planted in a one-inch mesh poultry black wire basket (galvanized wire may not disintegrate fast enough and impede root growth) which should include most of the roots and extend about 18 inches above the ground. Gophers and moles may be trapped or poisoned. For protection from animals chewing the bark above the ground, tar paper may be wrapped loosly and tied around the tree to a height of about 3 feet above ground. "Tanglefoot" may be smeared on the bark. Rabbits and deer may be kept away by sprinkling the plants with a solution of blood meal.

The best insurance against tree and shrub insect pests and disease is a properly nourished, healthy plant. For ordinary spraying on ornamental trees and shrubs for such insects and diseases as aphis, thrips, black scale, blight and mildew, the small packages or bottles of prepared chemicals (which may be obtained at any seed store or nursery) will probably be safer and more convenient to use than by preparing homemade solutions of poisons which might be injurious to children, dogs, et cetera. Many of the control chemicals sold under various trade-names are non-poisonous to humans, domestic animals or fowls.

Where there are any special problems of plant insects or diseases, information or assistance should be requested from the California Forest and Range Experiment Station at Berkeley or from the Principal Pathologist of the Bureau of Plant Industry of the Department of Agriculture, who is located in the Regional Office.

LISTS OF

TREES, SHRUBS AND FLOWERS

FOR PLANTING ON

ADMINISTRATIVE SITES

IN THE

CALIFORNIA REGION

U. S. FOREST SERVICE

By

L. Glenn Hall
Landscape Engineer

APPENDIX L

APPENDIX L

EXPLANATION OF

PLANT LISTS AND PLANTING DISTRICTS

For the purpose of suggesting ornamental trees, shrubs and other plants suitable for planting on Administrative Sites, the California Region of the Forest Service is divided into six planting districts. The districts are further sub-divided into elevation belts. Each elevation belt constitutes a minor climatic province somewhat different from the others.

It should be understood that these designations are very broadly generalized. In some cases districts and elevation belts will overlap. However, an endeavor has been made to indicate (by an X) the elevation belts where each species will thrive best.

Most species have a wide geographical range of adaptability, provided they are planted locally in sites favorable to their growth. As a general guide in planting species in adaptable locations the list includes a column headed "Natural Habitat", which is designated by a symbol referring to a table of various conditions under which each species is most commonly found growing naturally.

Since water for irrigating or sprinkling plants will be available on most Administrative Sites, many California native plants have been listed in Districts outside of their natural habitat. The Arizona Ash, which is native in Southern Arizona and in the Owens River Valley in California, along the banks of streams, is probably the outstanding example of a native tree which has been found adaptable (with artificial watering) almost throughout California with the exception of very high elevations in the Sierras.

Plant names, in most cases, are in accord with "Standardized Plant Names" of 1923, by the American Joint Committee on Horticultural Nomenclature. In some instances Sudworth or Jepson are used as authorities. Since the lists are for practical horticultural use and not for botanical reference, authority for each name is not indicated.

PLANTING DISTRICTS IN CALIFORNIA

1. North Coast Range (and Monterey Coast)

National Forests: Klamath, Trinity, Mendocino, Western portion of Shasta, and Monterey Division of Santa Barbara.

a.	Fog belt	Elevation	100 - 1500 feet
b.	Foothill Chaparral Belt	"	1500 - 2500 "
c.	High Interior Valleys	"	2500 - 3500 "
d.	Ponderosa Pine Slopes	"	above 3500 "

2. Northeastern California (Oregon line to Lake Tahoe)

National Forests: Modoc, and eastern portions of Shasta, Lassen, Plumas, Tahoe and Eldorado.

a.	Creek and River Canyons	Elevation	2500 - 3500 feet
b.	Sagebrush Valleys	"	3500 - 5500 "
c.	Ponderosa Pine Plateaus and Slopes	"	4000 - 6000 "

3. Sierra Nevada, Western Slope (South of Pit River)

National Forests: Stanislaus, Sierra, and western portions of Lassen, Plumas, Tahoe, Eldorado, and Sequoia.

a.	Valley Grassland	Elevation	500 - 1000 feet
b.	Foothill Chaparral and Woodland	"	1000 - 3000 "
c.	Ponderosa Pine Slopes	"	3000 - 5000 "
d.	Fir and Lodgepole Pine	"	5000 - 7000 "
e.	Timber-line Zone	"	7000 - 9000 "

4. Sierra Nevada, Eastern Slope

National Forests: Mono, and northern portion of Inyo.

a.	Sagebrush Valleys	Elevation	4000 - 6000 feet
b.	Jeffrey Pine Woodland	"	5000 - 6500 "
c.	Lodgepole Pine Timber	"	6500 - 9000 "

5. Southern California, Coast

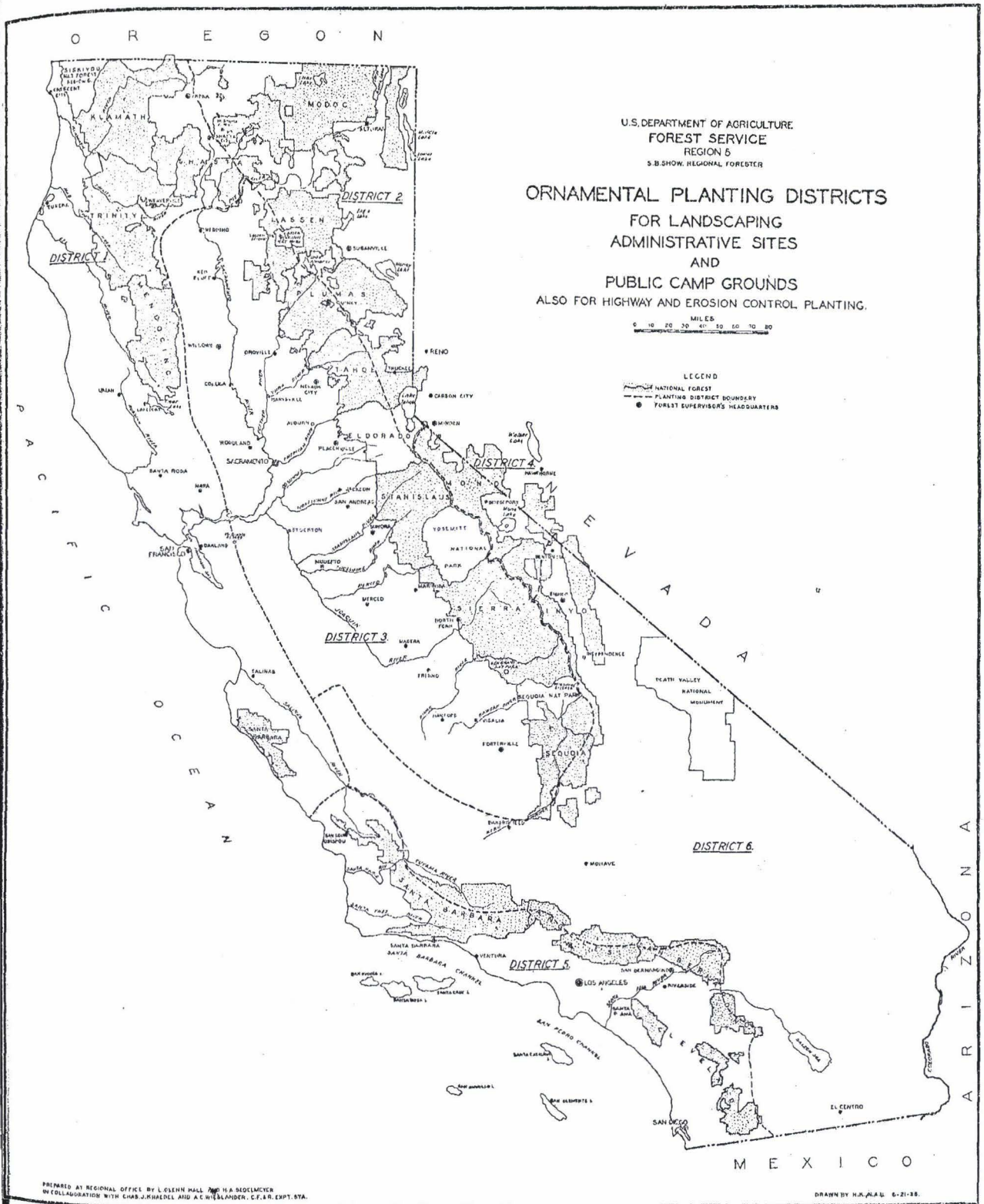
National Forests: Coastal portions of Santa Barbara (except Monterey Division), Angeles, San Bernardino and Cleveland.

a.	Fog-belt	Elevation	100 - 1500 feet
b.	Foothill Chaparral	"	1500 - 3000 "
c.	High Interior Valleys	"	3000 - 5000 "
d.	Ponderosa Pine Flats and Slopes	"	3500 - 7500 "

6. Southern California, Semi-arid and Desert Interior

National Forests: Those portions of Inyo, Sequoia, Santa Barbara, Angeles, San Bernardino and Cleveland, bordering desert.

a.	Dry Valleys and Canyons	Elevation	500 - 1000 feet
b.	" " Mesas and Canyons	"	1000 - 2000 "
c.	" " " " "	"	2000 - 3000 "
d.	" " " " Mountains	"	3000 - 4000 "


O R E G O N
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION 5
S.B.SHOW, REGIONAL FORESTER
ORNAMENTAL PLANTING DISTRICTS
FOR LANDSCAPING
ADMINISTRATIVE SITES
AND
PUBLIC CAMP GROUNDS
ALSO FOR HIGHWAY AND EROSION CONTROL PLANTING.
MILES
0 10 20 30 40 50 60 70 80
LEGEND
NATIONAL FOREST
PLANTING DISTRICT BOUNDERY
FOREST SUPERVISOR'S HEADQUARTERS
DISTRICT 1
DISTRICT 2
DISTRICT 3
DISTRICT 4
DISTRICT 5
DISTRICT 6
KLAMATH
MODOC
TRINITY
LASSEN
PLUMAS
SHASTA
TAHOE
ELDORADO
STANISLAUS
SIERRA NEVADA
YOSEMITE NATIONAL PARK
SEQUOIA
SEQUOIA NAT. PARK
DEATH VALLEY NATIONAL MONUMENT
SANTA BARBARA
SAN BERNARDINO
SAN DIEGO
EL CENTRO
MOHAVE
RENO
CARSON CITY
SACRAMENTO
SAN FRANCISCO
OAKLAND
FRESNO
VISALIA
FORTERVILLE
LOS ANGELES
RIVERSIDE
VENTURA
SANTA BARBARA
SALINAS
MERCED
MODESTO
PACIFIC OCEAN
ARIZONA
MEXICO
PREPARED AT REGIONAL OFFICE BY L.GLENN HALL AND H.A.SIEDELMEYER
IN COLLABORATION WITH CHAS.J.KHADEL AND A.C.WIESLANDER, C.F.&R. EXPT. STA.
DRAWN BY H.K. ALAU 6-21-38.

KEY TO SYMBOLS USED IN PLANT LISTS

Approximate Heights of Mature Plants

Symbol	Trees	Shrubs	Perennials and Annuals
L = Large	Over 40 ft.	6 to 15 ft.	2-1/2 ft. and over
M = Medium	25 to 40 ft.	4 to 6 ft.	1 to 2 ft.
S = Small	15 to 25 ft.	4 ft. and under	2 to 12 inches

Natural Habitat

W-1 Cool, moist sites	Z-1 Dry, open flats or valleys
W-2 North slopes	Z-2 Hot, dry slopes
W-3 Stream banks	Z-3 Alkaline plains
W-4 Canyons, partial shade	Z-4 Canyons, full sun
W-5 Moist, well-drained loam	Z-5 Sandy, gravelly soil

Sh = Requires shade

Su = Requires full sun

Ps = Requires partial shade

Note: If no indication, plant will grow in either sun or partial shade.

X = will thrive in elevation belt indicated

- = will not thrive in elevation belt indicated

D = Deciduous E = Evergreen P = Perennial An = Annual

N = Native of California

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

Map Sym-bols	TREES	Natural Habitat	Type	Size	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
A.A.	Arizona Ash (Fraxinus velutina)	W3,5; Z5	D-N	M	X	X	X	X
O.A.	Oregon Ash (Fraxinus oregona)	W3,5	D-N	L	X	X	-	-
W.A.	White Alder (Alnus rhombifolia)	W3,4; Z5	D-N	L	X	X	-	-
R.A.	Red Alder (Alnus oregona)	W3,5; Z5	D-N	M	X	X	-	-
B.W-e	Black Walnut - Eastern (Juglans nigra)	W3	D	L	X	X	X	X
B.W-c	Black Walnut - California (Juglans hindsi)	W3	D-N	L	X	X	-	-
E.W.	English Walnut	W5	D	M	X	X	-	-
B.M.	Big-leaf Maple (Acer macrophyllum)	W3,4; Z5	D-N	L	X	X	-	-
B.E.	Boxelder (Acer negundo)	W3,4; Z5	D-N	M	X	X	X	X
Bky.	Buckeye (Aesculus californica)	W3,4; Z2,5	D-N	S	X	X	X	-
S.M.	Silver Maple - Eastern (Acer dasycarpum)	W5	D	L	X	X	X	X
C.E.	Chinese or Siberian Elm (Ulmus pumila)	Z5	D	M	X	X	X	X
P.T.	Chinese Pagoda Tree (Sophora japonica)	W5	D	L	X	X	X	X
C.B.	California Bay Tree (Umbellularia californica)	W1,4; Z5	E-N	M	X	X	-	-

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

Map Sym-bols	TREES	Natural Habitat	Type	Size	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
C.N.	California Nutmeg (Torreya californica)	W3,4; Z5	E-N	M	X	X	-	-
Chq.	Chinquapin (Tree) (Castanopsis chrysophylla)	W4; Z4,5	E-N	L	X	X	X	X
Cba.	Crab-apple, Flowering (Malus ioensis bechteli)	Z1	D	S	X	X	X	X
Dg.	Dogwood - Flowering (Cornus nuttali)	W2,4; Z5	D-N	S	X	X	-	-
Hw.	Hawthorn - Flowering	W5	D	S	X	X	X	X
E.L.	European Linden (Tilia platyphyllos)	W5	D	L	X	X	X	X
E.S.	European Sycamore (Platanus orientalis)	Z5	D	L	X	X	X	X
I.C.	Incense Cedar (Libocedrus decurrens)	W1,2,4	E-N	L	X	X	X	X
Po.C.	Port Oxford Cedar (Chamaecyparis lawsoniana)	W1,3,5; Z4,5	E-N	L	X	X	-	-
Ma.	Madrona (Arbutus menziesi)	W4,5	E-N	L	X	X	-	-
L.P.	Lombardy Poplar (Populus nigra pyramidalis)	W5	D	L	X	X	X	X
L.O.	Live Oak (Quercus agrifolia, wislizeni, or chrysolepis)	Z1,2,5	E-N	L	X	X	-	-
B.O.	Black Oak (Quercus kelloggi)	W2; Z5	D-N	L	X	X	X	X
R.O.	Red Oak - Eastern (Quercus rubra)	Z2,5	D	L	X	X	X	X

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

Map Sym-bols	TREES	Natural Habitat	Type	Size	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
Blu.O	Blue Oak (Quercus douglasi)	Z2,3,5	D-N	L	X	X	-	-
V.O.	Valley Oak (Quercus lobata)	W5; Z1	D-N	L	X	X	-	-
T.O.	Tan-bark Oak (Lithocarpus densiflora)	W1,3; Z5	E-N	L	X	X	-	-
Rdw.	Redwood - Coast (Sequoia sempervirens)	W1,3,5	E-N	L	X	X	-	-
C.P.	Coulter Pine (Pinus coulteri)	W2; Z2,5	E-N	L	X	X	X	X
S.P.	Sugar Pine (Pinus lambertiana)	W2,4,5; Z5	E-N	L	X	X	X	X
Y.P.	Yellow Pine (Pinus ponderosa)	W2,4; Z1,2,5	E-N	L	X	X	X	X
M.P.	Monterey Pine (Pinus radiata) (Only use on Monterey Coast)	W1,5	E-N	L	X	X	-	-
W.Y.	Western Yew (Taxus brevifolia)	W1,3,4; Z5	E-N	S	X	X	-	-
B.F.	Bristlecone Fir (Abies venusta) (Use on Monterey Coast)	W1,2,3,4; Z5	E-N	L	X	X	X	X

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
Abelia grandiflora	W1,5; Z5	E	M	X	X	-	-
Azalea occidentalis	W1,2,3,4, W5	D-N	M	X	X	-	-
Barberry - Darwin's (Berberis darwini)	W1,5	D-N	M	X	X	-	-
Barberry - Nevin's (Berberis nevini)	Z2,4,5	E-N	M	X	X	-	-
Bush Honeysuckle (Ionicera morrowi)	W1,5; Z5	D	M	X	X	X	X
Bush Chinquapin (Castanopsis sempervirens)	Z2,5	E-N	M	-	X	X	X
California Lilac (Ceanothus arboreus)	W2 Z2,4,5	E-N	L	X	X	-	-
California Lilac (Ceanothus thrysiflorus)	W3,4 Z2,4	E-N	M	X	X	-	-
Creek Dogwood (Cornus californica var. pubescens)	W3,4	D-N	L	X	X	-	-
Coffeeberry - dwarf (Rhamnus crocea)	Z2,4,5 W2,3,4	E-N	S	X	X	-	-
Coffeeberry (Rhamnus californica)	Z2,4,5 W3,4,5	E-N	M	X	X	X	X
Coralberry (Symphoricarpos vulgaris)	W3; Z5	D	S	X	X	X	X
Cotoneaster francheti	W5; Z5	E	M	X	X	X	-
Cotoneaster harroviana	W5; Z5	E	M	X	X	X	-

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
Cotoneaster horizontalis	W5; Z5	D	S	X	X	X	X
Cotoneaster microphylla	W5; Z5	E	S	X	X	X	-
Cotoneaster pannosa	W5; Z5	E	M	X	X	X	-
Deutzia gracilis	W1,5; Z5	D	S	X	X	X	X
Escallonia montevidensis	W1,5; Z5	E	L	X	X	-	-
Escallonia rubra	W1,5; Z5	E	M	X	X	-	-
Flowering Almond - dwarf	W1,5; Z5	D	L	X	X	X	X
Flowering Crabapple - dwarf	W1,5; Z5	D	L	X	X	X	X
Flowering Quince - dwarf	W1,5; Z5	D	S	X	X	X	X
Golden Bells (Forsythia fortunei or suspensa)	W1,5; Z5	D	M	X	X	X	X
Hazelnut (Corylus rostrata var. californica)	W1,2,3,4	D-N	L	X	X	X	X
Huckleberry - Calif. (Vaccinium ovatum)	W1,2,3,4	E-N	M	X	X	-	-
Holly - Calif. (Photinia arbutifolia)	W2,4,5 Z1,2,4,5	E-N	L	X	X	-	-
Holly-leaf Cherry (Prunus illicifolia)	W2,3,4,5 Z2,4,5	E-N	M	X	X	-	-
Juniper - Chinese (Juniperus chinensis pyramidalis)	W1,5; Z5	E	M	X	X	X	X
Juniper - Savin (Juniperus sabina)	W1,5; Z5	E	S	X	X	X	X
Juniper - Tamarix-leaved (Juniperus tamariscifolia)	W1,5; Z5	E	S	X	X	X	X

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
Laurustinus (Viburnum tinus)	W1,5; Z5	E	M	X	X	-	-
Lilac - Eastern (Syringa vulgaris)	W5	D	L	X	X	X	X
Manzanita - Green (Arctostaphylos patula)	Z1,5	E-N	M	X	X	X	X
Manzanita - Green (Arctostaphylos stanfordiana)	Z1,4,5	E-N	M	X	X	-	-
Mock Orange - Calif. (Philadelphus lewisi)	W1,2,3, W4,5	D-N	M	X	X	X	X
Mock Orange - Eastern (Philadelphus coronarius)	W1,3,5	D	L	X	X	X	X
Mock Orange - Eastern (Philadelphus virginalis)	W1,3,5	D	M	X	X	X	X
Mountain Ash (Sorbus sitchensis)	W3; Z4	D-N	M	-	X	X	X
Oregon Grape (Mahonia pinnata or repens)	W1,2,3,4	E-N	S	X	X	X	X
Privet - Calif. (Ligustrum ovalifolium) Hedge	W1,5; Z5	E	M	X	X	-	-
Privet - Nepal (Ligustrum nepalense) Hedge	W1,5; Z5	D	M	X	X	X	X
Privet (Ligustrum ibota)	W1,5; Z5	D	M	X	X	X	X
Pyracantha crenulata	W1,5; Z5	E	S	X	X	X	-
Pyracantha coccinea	W1,5; Z5	E	S	X	X	X	X
Pyracantha lalandi	W1,5; Z5	E	S	X	X	X	X

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
Redbud (Cercis occidentalis)	W3 Z2,4,5	D-N	L	X	X	X	X
Serviceberry (Amelanchier alnifolia)	W3,4; Z5	D-N	L	X	X	X	X
Snowbell (Styrax officinalis-var. californica)	Z2,4	D-N	M	X	X	-	-
Snowberry - Native (Symphoricarpus occidentalis)	W4	D-N	M	X	X	X	X
Snowberry - Native dwarf (Symphoricarpus mollis)	W1; Z4	D-N	S	X	X	X	X
Sweet Shrub - Calif. (Calycanthus occidentalis)	W1,3,4	E-N	M	X	X	X	-
Silk Tassel Bush (Garrya elliptica)	Z2,5	E-N	M	X	X	-	-
Spiraea douglasi	W1,3,5	D-N	S	X	X	X	X
Spiraea bumalda - Anthony Waterer	W5; Z5	D	S	X	X	X	X
Spiraea Van Houtte - Vanhoutte Spiraea	W5; Z5	D	M	X	X	X	X
Ocean Spray - Calif. (Holodiscus discolor)	W1,4	D-N	M	X	X	X	X
Viburnum-Korean (Viburnum carlesi)	W5; Z5	D	S	X	X	X	X
Vine Maple (Acer circinatum)	W3,4,5 Z5	D-N	L	X	X	-	-
Sierra Maple (Acer glabrum)	W3; Z4,5	D-N	L	-	-	X	X

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
Swiss Mountain Pine - dwarf (Pinus montana mughus)	W2; Z5	E	S	X	X	X	X
Smoketree (Rhus cotinus)	W2,5; Z5	D	L	X	X	X	X
Weigela rosea	W1,4,5	D	M	X	X	X	X

DISTRICT 1

NORTH COAST RANGE
(and Monterey Coast)

VINES AND GROUND COVER		Natural Habitat	Type	Elevation Belts 1-a 100 to 1500	1-b 1500 to 2500	1-c 2500 to 3500	1-d Over 3500
Creeping Myrtle (Vinca minor)	Sh	W1,2,5	E	X	X	X	-
Wood Strawberry (Fragaria californica)	Sh	W2,4,5 Z5	P-N	X	X	X	X
Sand Strawberry (Fragaria chiloensis)	Su	W1,4 Z4,5	P-N	X	X	-	-
Japanese Spurge (Pachysandra terminalis)	Sh	W1,5	E	X	X	X	X
Squaw Carpet (Ceanothus prostratus)	Ps	W2,4; Z5	E	-	X	-	-
English Ivy (Hedera helix)	Sh or Su	W1,2,4,5	E	X	X	-	-
Wild Honeysuckle (Lonicera subspicata)	Sh or Su	W1,2,4 Z5	D-N	X	X	X	X
Japanese Honeysuckle (Lonicera japonica halliana)	Sh or Su	W1,2,3, W4,5	D	X	X	X	X
Wisteria	Sh or Su	W1,2,3,4	D	X	X	X	X
Virginia Creeper	Sh or Su	W1,2,3 Z5	D	X	X	X	X
Hypericum calycinum	Sh	W5; Z5	E	X	X	X	-
Hypericum moserianum	Sh or Su	W5; Z5	E	X	X	X	-
Climbing Roses (Single Cherokee or Double Banksia for ground cover)	Su	W5; Z5	D	X	X	-	-
California Wild Grape (Vitis californica)	Sh	W1,3,4	D	X	X	-	-

Cotoneaster horizontalis and C. microphylla, Pyracantha crenulata, Oregon Grape and Rhamnus crocea may also be used as Ground Cover.

DISTRICT 2

NORTHEASTERN CALIFORNIA (CASCADE RANGE)
(Oregon Line to N.Fork Feather River)

Map Sym-bols	TREES	Natural Habitat	Type	Size	Elevation Belts 2-a 2500 to 3500	2-b 3500 to 5500	2-c 4000 to 6000
A.A.	Arizona Ash (Fraxinus velutina)	W3,5; Z5	D-N	M	X	X	-
G.A.	Green Ash (Fraxinus lanceolata)	W3,5	D	L	X	X	X
BW-e	Black Walnut - Eastern	W3	D	L	X	X	-
B.G.	Balm-of-Gilead (Populus candicans)	W3	D	L	X	X	X
Cl.P.	Carolina Poplar (Populus deltoides carolinensis)	W5	D	M	X	X	X
L.P.	Lombardy Poplar (Populus nigra italica)	W5	D	L	X	X	X
Q.A.	Quaking Aspen (Populus tremuloides)	W2,3	D-N	M	-	X	X
B.E.	Boxelder (Acer negundo)	W3,4; Z5	D-N	M	X	X	X
N.M.	Norway Maple (Acer platanoides)	W1,5	D	L	X	X	X
S.M.	Silver Maple (Acer dasycarpum)	W5	D	L	X	X	-
C.E.	Chinese Elm (Ulmus pumila)	Z1,5	D	M	X	X	-
P.T.	Chinese Pagoda Tree (Sophora japonica)	W5	D	L	X	X	-
C.N.	California Nutmeg (Torreya californica)	W3,4; Z5	E-N	M	X	-	-
Cba.	Crabapple - Flowering (Malus ioensis bechteli)	Z1	D	S	X	X	-

DISTRICT 2

NORTHEASTERN CALIFORNIA (CASCADE RANGE)
(Oregon Line to N.Fork Feather River)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 2-a 2500 to 3500	2-b 3500 to 5500	2-c 4000 to 6000
Dg.	Dogwood - Flowering (Cornus nuttali)	W1,2,4,5 Z5	D-N	S	X	-	-
E.L.	European Linden (Tilia platyphyllos)	W5	D	L	X	X	-
E.S.	European Sycamore - Plane (Platanus orientalis)	Z5	D	L	X	X	X
I.C.	Incense Cedar (Libocedrus decurrens)	W1,2,4	E-N	L	X	X	X
F.M.	Fruitless Mulberry - Kingan	W3; Z5	D	L	X	X	X
B.O.	Black Oak - California (Quercus kelloggi)	W5	D-N	L	X	-	-
R.O.	Red Oak - Eastern (Quercus rubra)	Z5	D	L	X	X	X
P.O.	Pin Oak - Eastern (Quercus palustris)	W5	D	M	X	X	-
W.B.	White Cut-leaf Birch (Betula alba laciniata pendula)	W5	D	M	X	-	X
Y.P.	Yellow Pine (Pinus ponderosa)	W2,4 Z2,5	E-N	L	X	X	X
J.P.	Jeffrey Pine (Pinus jeffreyi)	W3,5; Z5	E-N	L	-	X	X
S.P.	Sugar Pine (Pinus lambertiana)	W2,4,5 Z5	E-N	L	X	X	X

DISTRICT 2

NORTHEASTERN CALIFORNIA (CASCADE RANGE)
(Oregon Line to N.Fork Feather River)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 2-a 2500 to 3500	2-b 3500 to 5500	2-c 4000 to 6000
Bush Honeysuckle (Lonicera morrowi)	W1,5; Z5	D	M	X	X	X
Coffeeberry (Rhamnus californica)	Z2,4,5 W3,4,5	E-N	M	X	-	X
Coralberry (Symphoricarpos vulgaris)	W3; Z5	D	S	X	X	X
Snowberry (Symphoricarpos occidentalis)	W4	D-N	M	X	-	-
Snowberry - dwarf (Symphoricarpos mollis)	W4,5; Z5	D-N	S	-	X	X
Creek Dogwood (Cornus californica var. nevadensis)	W3,4	D-N	L	X	-	X
Deutzia gracilis	W1,5; Z5	D	S	X	X	X
Elderberry - blue (Sambucus glauca)	W3; Z1,2 Z3,4,5	D-N	L	X	-	-
Flowering Almond - dwarf	W1,5; Z5	D	M	X	X	X
Flowering Crabapple (Malus arnoldiana)	W1,5; Z5	D	L	X	X	X
Flowering Crabapple - dwarf (Malus sargenti)	W1,5; Z5	D	M	X	X	X
Flowering Quince - dwarf	W1,5; Z5	D	S	X	X	X
Golden Bells (Forsythia fortunei or suspensa)	W1,5; Z5	D	M	X	X	X
Lilac - Eastern (Syringa vulgaris)	W5	D	L	X	X	X

DISTRICT 2

NORTHEASTERN CALIFORNIA (CASCADE RANGE)
(Oregon Line to N.Fork Feather River)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 2-a 2500 to 3500	2-b 3500 to 5500	2-c 4000 to 6000
Mock Orange - Wild (Philadelphus lewisi)	W1,2,3, W4,5	D-N	M	X	X	X
Mock Orange - Eastern (Philadelphus coronarius)	W1,2,3, W4,5	D	L	X	X	X
Mock Orange - Eastern (Philadelphus virginalis or lemoinei)	W1,2,3, W4,5	D	M	X	X	X
Manzanita - Green (Arctostaphylos patula)	Z1,2,5	E-N	M	X	-	X
Oregon Grape (Mahonia pinnata)	W1,2,3,4	E-N	S	X	X	X
Serviceberry (Amelanchier alnifolia)	W3,4; Z5	E-N	L	X	-	X
Smoketree (Rhus cotinus)	W5; Z5	D	L	X	X	X
Snowball Bush (Viburnum opulus sterile)	W1,5	D	L	X	X	X
Spiraea bumalda - Anthony Waterer	W5; Z5	D	S	X	X	X
Spiraea Van Houtte - vanhoutte spiraea	W5; Z5	D	M	X	X	X
Weigela rosea	W1,4,5	D	M	X	X	X
Wild (Bitter) Cherry (Prunus emarginata)	W3 Z1,4,5	D-N	M	X	X	X
Wild Plum (Prunus sub-cordata)	Z2,4,5	D-N	L	X	X	X
Privet (for hedge) (Ligustrum ibota or vulgaris)	W1,5; Z5	D	M	X	X	X

DISTRICT 2

NORTHEASTERN CALIFORNIA (CASCADE RANGE)
(Oregon Line to N.Fork Feather River)

VINES AND GROUND COVER		Natural Habitat	Type	Elevation Belts 2-a 2500 to 3500	2-b 3500 to 5500	2-c 4000 to 6000
Squaw Carpet (Ceanothus prostratus)	Ps or Sh	W2,4; Z5	E-N	-	X	X
Wood Strawberry (Fragaria californica)	Sh	W2,4,5 Z5	D-N	X	X	X
Japanese Honeysuckle (Lonicera japonica halliana)	Su or Sh	W1,2,3,4 Z5	D	X	X	X
Wisteria		W1,2,3,4 Z5	D	X	X	X
Boston Ivy (Ampelopsis tricuspidata)	Su or Sh	W1,2,3,4 Z5	D	X	X	X

Oregon Grape may also be used as Ground Cover

DISTRICT 3

SIERRA NEVADA (Western Slope)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Cl.P.	Carolina Poplar (Populus carolinensis)	W3,5	D	M	X	X	X	X	-
L.P.	Lombardy Poplar (Populus nigra italica)	W3,5	D	L	X	X	X	-	-
Q.A.	Quaking Aspen (Populus tremuloides)	W1,3,5	D-N	M	-	-	-	X	X
Cba.	Crabapple - Flowering (Malus ioensis bechteli)	Z1	D	S	X	X	X	-	-
Dg.	Dogwood - Flowering (Cornus nuttali)	W2,4; Z5	D-N	S	-	X	X	-	-
Hw.	Hawthorn - Flowering	W5	D	S	X	X	X	-	-
E.L.	European Linden (Tilia platyphyllos)	W5	D	L	X	X	X	-	-
E.S.	European Sycamore - Plane (Platanus orientalis)	Z5	D	L	X	X	X	-	-
S.G.	Sweet Gum - Eastern (Liquidambar styraciflua)	W3	D	M	X	X	X	-	-
T.T.	Tulip Tree - Eastern (Liriodendron tulipifera)	W5	D	L	X	X	X	-	-
C.B.	California Bay (Umbellularia californica)	W1,4; Z5	E-N	M	X	X	-	-	-
C.N.	California Nutmeg (Torreya californica)	W3,4; Z5	E-N	M	X	X	-	-	-
Ma.	Madrona (Arbutus menziesi)	W4,5	E-N	L	X	X	X	-	-

DISTRICT 3

SIERRA NEVADA (Western Slope)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
L.O.	Live Oaks (Quercus agrifolia, wislizeni, or chrysolepis)	Z1,2,5	E-N	L	X	X	-	-	-
B.O.	Black Oak (Quercus kelloggi)	W2; Z5	D-N	L	X	X	X	-	-
Blu.O	Blue Oak (Quercus douglasi)	Z2,3,5	D-N	L	X	X	X	-	-
T.O.	Tan Bark Oak (Lithocarpus densiflora)	W1,3; Z5	E-N	L	X	X	-	-	-
V.O.	Valley Oak (Quercus lobata)	W5; Z1	D-N	L	X	-	-	-	-
R.O.	Red Oak - Eastern (Quercus rubra)	Z2,5	D	L	-	X	X	-	-
I.C.	Incense Cedar (Libocedrus decurrens)	W1,2,4	E-N	L	X	X	X	-	-
Bt.	Big Tree (Sequoia gigantea)	W1; Z5	E-N	L	-	-	X	X	-
W.J.	Western Juniper (Juniperus occidentalis)	Z2,5	E-N	L	-	-	-	-	X
M.H.	Mountain Hemlock (Tsuga mertensiana)	W2,5	E-N	L	-	-	-	-	X
Sv.P.	Western White Silver Pine (Pinus monticola)	W2,5	E-N	L	-	-	-	X	X
Lg.P.	Lodgepole Pine (Pinus contorta)	W2,5	E-N	L	-	-	-	X	X
J.P.	Jeffrey Pine (Pinus jeffreyi)	W3,5; Z5	E-N	L	-	-	X	X	-

DISTRICT 3

SIERRA NEVADA (Western Slope)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Y.P.	Yellow Pine (Pinus ponderosa)	W2,4 Z2,5	E-N	L	-	X	X	-	-
S.P.	Sugar Pine (Pinus lambertiana)	W2,4,5 Z5	E-N	L	-	X	X	-	-
C.P.	Coulter Pine (Pinus coulteri)	W2; Z2,5	E-N	L	X	X	X	-	-

DISTRICT 3

SIERRA NEVADA (Western Slope)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Abelia grandiflora	W1,5; Z5	E	M	X	X	-	-	-
Azalea occidentalis	W1,2,3,4	D-N	M	X	X	X	-	-
Barberry - Darwin's (Berberis darwini)	W1,5	E	M	X	X	-	-	-
Barberry - Nevin's (Berberis nevini)	Z2,4,5	E-N	M	X	X	-	-	-
Bush Honeysuckle (Lonicera morrowi)	W1,5; Z5	D	M	X	X	X	X	-
Bush Sunflower (Encelia californica)	Z2,4,5	P-N	S	X	X	-	-	-
California Lilac (Ceanothus arboreus)	Z2,4	E-N	L	X	X	-	-	-
California Lilac (Ceanothus cyaneus)	Z2,4,5	E-N	M	X	X	-	-	-
California Lilac (Ceanothus intergerrimus)	W2,4 Z4,5	E-N	M	-	X	X	X	-
California Lilac (Ceanothus thrysiflorus)	W3,4 Z2,4,5	E-N	M	X	X	-	-	-
Carpenteria californica	Z2,4	E-N	M	X	X	-	-	-
Coffeeberry (Rhamnus californica)	W2,4 Z2,4,5	E-N	M	X	X	X	X	-
Coffeeberry - dwarf (Rhamnus crocea)	Z2,4,5	E-N	S	X	X	X	-	-
Coralberry (Symphoricarpos vulgaris)	W3; Z5	D	S	X	X	X	X	-
Snowberry (Symphoricarpos occidentalis)	W1,2,4	D-N	M	X	X	X	X	-

DISTRICT 3

SIERRA NEVADA (Western Slope)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Snowberry (Symphoricarpos mollis)	W1,2,4	D-N	S	X	X	X	X	X
Creek Dogwood (Cornus californica)	W1,2,3,4	D-N	L	-	X	X	X	X
Cotoneaster francheti	W5; Z5	E	L	X	X	-	-	-
Cotoneaster harroviana	W5; Z5	E	M	X	X	-	-	-
Cotoneaster horizontalis	W5; Z5	D	S	X	X	X	X	-
Cotoneaster microphylla	W5; Z5	E	S	X	X	-	-	-
Cotoneaster pannosa	W5; Z5	E	L	X	X	X	-	-
Deutzia gracilis	W1,5; Z5	D	S	X	X	X	X	X
Elderberry (Sambucus glauca)	W3; Z1,3 Z4,5	D-N	L	X	X	X	-	-
Flowering Almond - Dwarf	W1,5; Z5	D	L	X	X	X	-	-
Flowering Crabapple - Dwarf	W1,5; Z5	D	L	X	X	X	X	-
Flowering Quince - Dwarf	W1,5; Z5	D	S	X	X	X	X	X
Flowering Ash (Fraxinus dipetala)	W3,4 Z4,5	D-N	L	X	X	X	-	-
Fremontia californica	Z2,4,5	E-N	L	X	X	-	-	-
Golden Bells (Forsythia fortunei or suspensa)	W1,5; Z5	D	M	X	X	X	X	X
Hazelnut (Corylus rostrata var. californica)	W1,2,3,4	D-N	M	-	X	X	X	-
Holly - Calif. (Toyon) (Photinia arbutifolia)	W4 Z1,2,4,5	E-N	L	X	X	-	-	-

DISTRICT 3

SIERRA NEVADA (Western Slope)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Holly-leaf Cherry (Prunus ilicifolia)	W3,4,5 Z4,5	E-N	M	X	X	-	-	-
Juniper-Chinese (Juniperus chinensis pyramidalis)	W5; Z5	E	M	X	X	X	X	-
Juniper - Savin (Juniperus sabina)	W5; Z5	E	S	X	X	X	X	-
Juniper - Tamarix-leaved (Juniperus sabina tamariscifolia)	W5; Z5	E	S	X	X	X	X	X
Manzanita - Green (Arctostaphylos patula)	Z1,2,4,5	E-N	M	X	X	X	X	X
Matilija Poppy (Romneya coulteri)	Z4,5	P-N	M	X	X	-	-	-
Mountain Ash (Sorbus sitchensis)	W3; Z4	D-N	M	-	-	-	X	X
Mountain Mahogany (Cercocarpus betulaefolius)	W2; Z4,5	E-N	L	X	X	X	-	-
Mock Orange - Calif. (Philadelphus lewisi)	Z2,4	D-N	M	X	X	X	X	-
Mock Orange - Eastern (Philadelphus coronarius)	W1,2,3 W4,5	D	L	X	X	X	X	-
Mock Orange - Eastern (Philadelphus virginalis)	W1,2,3 W4,5	D	M	X	X	X	X	-
Monkey Flower (Mimulus glutinosus)	Z2,4,5	P-N	S	X	X	X	-	-
Oregon Grape (Mahonia pinnata or repens)	W1,2,3,4	E-N	S	X	X	X	X	X
Privet - Calif. Hedge (Ligustrum ovalifolium)	W1,5; Z5	E	M	X	X	X	-	-

DISTRICT 3

SIERRA NEVADA (Western Slope)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Privet Nepal - Hedge (Ligustrum nepalense)	W1,5; Z5	D	M	X	X	X	-	-
Pyracantha crenulata	W1,5; Z5	E	S	X	X	-	-	-
Pyracantha coccinea	W1,5; Z5	E	S	X	X	X	X	-
Pyracantha lalandi	W1,5; Z5	E	S	X	X	X	-	-
Redbud (Cercis occidentalis)	W3; Z2,4 Z5	D-N	L	-	X	X	-	-
Snowbell Bush (Styrax officinalis var. californica)	Z2,4	D-N	M	X	X	-	-	-
Serviceberry (Amelanchier alnifolia)	W3,4; Z5	D-N	L	-	-	-	X	X
Sweetshrub - Calif. (Calycanthus occidentalis)	W1,3,4	D-N	M	X	X	X	-	-
Spiraea douglasi	W1,3,5	D	S	-	-	X	X	-
Spiraea bumalda - Anthony Waterer	W5; Z5	D	S	X	X	X	X	X
Spiraea Van Houtte - vanhoutte spiraea	W5; Z5	D	L	X	X	X	X	X
Swiss Mountain Pine - dwarf (Pinus montana mughus)	W2; Z5	E	S	X	X	X	X	X
Smoketree (Rhus cotinus)	W2,5; Z5	D	L	X	X	X	X	-
Sierra Maple (Acer glabrum)	W3,4,5 Z5	D-N	L	-	-	-	X	X
Tree Poppy (Dendromecon rigida)	Z2,4,5	P-N	M	X	X	-	-	-
Viburnum - Korean (Viburnum carlesi)	W5; Z5	D	S	X	X	X	X	X

DISTRICT 3

SIERRA NEVADA (Western Slope)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Virburnum - Common Snowball Bush (Viburnum opulus sterile)	W1,5	D	L	X	X	X	X	-
Weigela rosea	W1,4,5	D	M	X	X	X	X	X

DISTRICT 3

SIERRA NEVADA (Western Slope)

VINES AND GROUND COVERS		Natural Habitat	Type	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Calif. Wild Grape (Vitis californica)	Ps or Sh	W1,3,4	D	X	X	-	-	-
Creeping Myrtle (Vinca minor)	Sh	W1,2,5	E	X	X	-	-	-
Wood Strawberry (Fragaria californica)	Sh	W2,4,5 Z5	P-N	-	X	X	X	-
Sand Strawberry (Fragaria chiloensis)	Su	W1; Z4,5	P-N	X	X	-	-	-
Japanese Spurge (Pachysandra terminalis)	Sh	W1,5	P	X	X	X	X	X
Squaw Carpet (Ceanothus prostratus)	Sh or Ps	W2,4; Z5	E-N	-	-	X	X	-
Hypericum calycinum	Sh	W5; Z5	E	X	X	-	-	-
Hypericum moserianum	Su or Sh	W5; Z5	E	X	X	-	-	-
English Ivy (Hedera helix)	Su or Sh	W1,2,4,5	E	X	X	-	-	-
Wild Honeysuckle (Lonicera subspicata)	Su or Sh	W1,2,4	E-N	X	X	X	-	-
Japanese Honeysuckle (Lonicera japonica halliana)	Su or Sh	W1,2,3 W4,5	D	X	X	X	X	-
Wisteria	Su or Sh	W1,2,3 W4,5	D	X	X	X	X	-
Virginia Creeper (Ampelopsis quinquefolia)	Su or Sh	W1,2,3,4 W5; Z4,5	D	X	X	X	X	-
Boston Ivy (Ampelopsis veitchi)	Su or Sh	W1,5; Z5	D	X	X	X	X	X

DISTRICT 3

SIERRA NEVADA (Western Slope)

VINES AND GROUND COVERS		Natural Habitat	Type	Elevation Belts 3-a 500 to 1000	3-b 1000 to 3000	3-c 3000 to 5000	3-d 5000 to 7000	3-e 7000 to 9000
Climbing Roses (Single Cherokee or double Banksia for ground cover)	Su or Sh	W5; Z4,5	D	X	X	X	-	-
Lippia Repens (low-grass-like)		W1; Z5	P	X	X	-	-	-

Cotoneaster horizontalis and C. microphylla, Pyracantha crenulata, Oregon Grape and Rhamnus crocea may also be used as ground cover.

DISTRICT 4

SIERRA NEVADA (Eastern Slope)

Map Sym-bols	TREES	Natural Habitat	Type	Size	Elevation Belts 4-a 3000 to 5000	4-b 5000 to 6500	4-c 6500 to 9000
A.A.	Arizona Ash (Fraxinus velutina)	W3,5; Z5	D-N	M	X	X	-
G.A.	Green Ash (Fraxinus lanceolata)	W3,5	D	L	X	X	-
BW-e	Black Walnut - Eastern	W3,5	D	L	X	X	-
B.E.	Boxelder (Acer negundo)	W3,4; Z5	D-N	M	X	X	-
N.M.	Norway Maple (Acer platanoides)	W5	D	L	X	X	-
R.M.	Red Maple (Acer rubrum)	W3	D	L	X	X	-
C.E.	Chinese Elm (Ulmus pumila)	Z1,5	D	M	X	X	-
W.E.	Winged Elm (Ulmus alata)	W1,5	D	M	X	-	-
P.T.	Chinese Pagoda Tree (Sophora japonica)	W5	D	L	X	X	-
B.G.	Balm-of-Gilead (Populus candicans)	W3	D	L	X	X	-
Cl.P.	Carolina Poplar (Populus deltoides carolinensis)	W3	D	M	X	X	-
L.P.	Lombardy Poplar (Populus nigra italica)	W5	D	L	X	X	-
Q.A.	Quaking Aspen (Populus tremuloides)	W1,3; Z5	D-N	M	-	X	X
E.S.	European Sycamore - Plane (Platanus orientalis)	Z5	D	L	X	X	-

DISTRICT 4

SIERRA NEVADA (Eastern Slope)

Map Sym-bols	TREES	Natural Habitat	Type	Size	Elevation Belts 4-a 3000 to 5000	4-b 5000 to 6500	4-c 6500 to 9000
F.M.	Fruitless Mulberry - Kingan	W3; Z5	D	L	X	X	-
W.B.	Water Birch (Betula fontinalis)	W3,4	D-N	S	-	X	X
R.O.	Red Oak - Eastern (Quercus rubra)	Z2,5	D	L	X	X	-
Y.W.	Yellow Willow (Salix lasiandra)	W1,3	D-N	M	X	X	X
W.J.	Western Juniper (Juniperus occidentalis)	Z2,5	E-N	L	-	X	X
I.C.	Incense Cedar (Libocedrus decurrens)	W1,2,4	E-N	L	-	X	X
J.P.	Jeffrey Pine (Pinus jeffreyi)	W3,5; Z5	E-N	L	-	X	-
W.P.	White-bark Pine (Pinus albicaulis)	W5	E-N	L	-	-	X
Lg.P.	Lodgepole Pine (Pinus contorta)	W2,5	E-N	L	-	-	X

DISTRICT 4

SIERRA NEVADA (Eastern Slope)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 4-a 3000 to 5000	4-b 5000 to 6500	4-c 6500 to 9000
Bitter Cherry (Prunus emarginata)	W2,3 Z1,4,5	D	M	-	X	X
Bush Honeysuckle (Lonicera morrowi)	W1,5; Z5	D	M	X	X	X
Coffeeberry (Rhamnus californica var. virida)	W3,4,5 Z4,5	E-N	M	-	X	X
Coral Berry (Symphoricarpos vulgaris)	W3; Z5	D	S	X	X	X
Snowberry (Symphoricarpos rotundifolius var. oreophilus)	W1,2,4 Z5	D-N	S	-	X	X
Deutzia gracilis	W1,5; Z5	D	S	X	X	X
Desert Holly - dwarf (Atriplex hymenelytra)	Z1,3,5	P-N	S	X	-	-
Desert Peach (Prunus andersoni)	Z1,2,5	D-N	M	X	-	-
Flowering Almond - dwarf	W1,5; Z5	D	L	X	X	-
Flowering Crabapple - dwarf	W1,5; Z5	D	L	X	X	-
Flowering Quince - dwarf	W1,5; Z5	D	S	X	X	X
Golden Bells (Forsythia fortunei or suspensa)	W1,5; Z5	D	M	X	X	X
Lilac - Eastern (Syringa vulgaris)	W5	D	L	X	X	-
Mock Orange - Eastern (Philadelphus coronarius)	W1,3,5	D	L	X	X	X
Mock Orange - Eastern (Philadelphus lemoinei and virginalis)	W1,3,5	D	L	X	X	X

DISTRICT 4

SIERRA NEVADA (Eastern Slope)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 4-a 3000 to 5000	4-b 5000 to 6500	4-c 6500 to 9000
Privet (for hedge) (Ligustrum ibota or vulgaris)	W1,5; Z5	D	M	X	X	X
Serviceberry (Amelanchier alnifolia)	W3,4; Z5	D-N	L	-	X	X
Smoke Tree - Eastern (Rhus cotinus)	W5; Z5	D	L	X	X	X
Snowball Bush - Eastern (Viburnum opulus sterile)	W1,5	D	L	X	X	X
Spiraea bumalda - Anthony Waterer	W5; Z5	D	S	X	X	X
Spiraea Van Houtte - Vanhoutte Spiraea	W5; Z5	D	M	X	X	X
Weigela rosea	W1,4,5	D	M	X	X	X

DISTRICT 4

SIERRA NEVADA (Eastern Slope)

VINES AND GROUND COVER		Natural Habitat	Type	Elevation Belts 4-a 3000 to 5000	4-b 5000 to 6500	4-c 6500 to 9000
Wood Strawberry (Fragaria californica)	Sh	W2,4,5 Z5	D-N	-	X	X
Japanese Honeysuckle (Lonicera japonica halliana)	Su or Sh	W1,2,3,4 Z5	D	X	X	X
Wisteria	Su or Sh	W1,2,3,4 Z5	D	X	X	-
Boston Ivy (Ampelopsis veitchi)	Su or Sh	W1,2,3,4 Z5	D	X	X	X
California Wild Desert Grape (Vitis girdiana)	Sh	W3,4; Z5	D-N	X	X	-

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
Crb.	Carob - St. John's Bread (Ceratonia siliqua)	W5; Z1,5	E	M	X	X	-	-
Eu.py	Eucalyptus - Red Box (Eu. polyanthemos)	Z1,2,5	E	M	X	X	-	-
Eu. sx-r	Eucalyptus Pink Iron bark (Eu. sideroxylon rosea)	W5 Z1,2,5	E	M	X	X	-	-
Eu.rd	Eucalyptus - Desert Gum (Eu. rudis)	Z1,5	E	L	X	X	-	-
Eu.rs	Eucalyptus - Red Gum (Eu. rostrata)	W3,5	E	L	X	X	-	-
S.O.	Silk Oak (Grevillea robusta)	W1,5	E	L	X	X	-	-
P.P.	Peruvian Pepper (Schinus molle)	W5; Z5	E	L	X	X	-	-
Bz.P.	Brazilian Pepper (Schinus terebinthifolius)	W5	E	L	X	X	-	-
C.C.	Catalina Cherry (Prunus integrifolia)	W4; Z2,5	E-N	S	X	X	X	-
C.I.	Catalina Ironwood (Lyonothamnus floribundus)	W4; Z2,5	E-N	S	X	X	X.	-
J.T.	Jerusalem Thorn. (Parkinsonia aculeata)	Z1,2,3	E-N	S	X	X	-	-
Bfw.	Beefwood (Casuarina striota)	Z1,2,5	E	M	X	X	-	-
C.I.P.	Canary Island Pine (Pinus canariensis)	W5; Z5	E	L	X	X	-	-
C.P.	Coulter Pine (Pinus coulteri)	W2; Z2,5	E-N	L	X	X	X	X

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
B.P.	Bishop Pine (Pinus muricata)	W1,3; Z5	E-N	L	X	X	X	X
T.P.	Torrey Pine (Pinus torreyana)	Z2,5	E-N	M	X	X	-	-
I.C.	Incense Cedar (Libocedrus decurrens)	W1,2,4	E-N	L	X	X	X	X
A.C.	Arizona Cypress (Cupressus arizonica)	W2,5 Z2,5	E	M	X	X	-	-
T.C.	Tecate Cypress (Cupressus forbesi)	Z2,5	E-N	M	X	X	X	-
A.A.	Arizona Ash (Fraxinus velutina)	W2,3; Z5	D-N	M	X	X	X	-
B.W.e	Black Walnut - Eastern (Juglans nigra)	W3	D	L	X	X	X	-
B.W.c	Black Walnut - California (Juglans hindsi)	W3	D-N	L	X	X	-	-
E.W.	English Walnut - California (Juglans californica)	W3	D	M	X	X	-	-
B.G.	Balm-of-Gilead (Populus candicans)	W3	D	L	X	X	X	X
B.M.	Big-leaf Maple (Acer macrophyllum)	W3,4; Z5	D-N	L	X	X	X	X
S.M.	Silver Maple (Acer dasycarpum)	W3	D	L	X	X	X	X
B.E.	Boxelder (Acer negundo)	W3,4; Z5	D-N	M	X	X	X	X
Bky.	Buckeye (Aesculus californica)	W3,4 Z2,5	D-N	S	X	X	X	-

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
C.E.	Chinese or Siberian Elm (Ulmus pumila)	Z1,5	D	M	X	X	X	X
E.E.	Evergreen Chinese Elm (Ulmus parvifolia)	W1,5	E	M	X	X	-	-
P.T.	Chinese Pagoda Tree (Sophora japonica)	W5	D	L	X	X	X	X
C.B.	California Laurel (Bay) Tree (Umbellularia californica)	W1,4; Z5	E-N	M	X	X	X	X
C.N.	California Nutmeg (Torreya californica)	W3,4; Z5	E-N	M	X	X	X	-
Cba.	Crabapple - Flowering (Malus ioensis bechteli)	Z1	D	S	X	X	X	X
Alm.-f	Almond - Flowering - Dwarf	W5; Z5	D	S	X	X	X	X
Dg.	Dogwood - Flowering (Cornus nuttali)	W1,2,4 Z5	D-N	S	-	X	X	X
E.S.	European Sycamore - Plane (Platanus orientalis)	Z1,5	D	L	X	X	X	X
C.S.	California Sycamore (Platanus racemosa)	W3; Z4,5	D-N	L	X	X	X	-
S.G.	Sweet Gum - Eastern (Liquidambar styraciflua)	W1,3,5	D	M	X	X	X	-
T.T.	Tulip Tree - Eastern (Liriodendron tulipifera)	W1,5	D	L	X	X	X	-
L.O.	Live Oaks (Quercus agrifolia or chrysolepis)	W2,4,5 Z1,2,5	E-N	L	X	X	X	-
B.O.	Black Oak (Quercus kelloggi)	W2; Z5	D-N	L	X	X	X	-

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
Blu.O	Blue Oak (Quercus douglasi)	Z1,2,4,5	D-N	L	X	X	X	-
E.W.O	Evergreen White Oak (Quercus engelmanni)	Z1,2,4,5	E-N	L	X	X	X	-

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
Abelia grandiflora	W1,5; Z5	E	M	X	X	-	-
Barberry - Darwin's (Berberis darwini)	W1,5	E	M	X	X	-	-
Barberry - Nevin's (Berberis nevini)	Z2,4,5	E-N	M	X	X	-	-
Barberry - Wilson's (Berberis wilsonae)	W5; Z5	E	S	X	X	-	-
Boxwood - English (Buxus sempervirens)		E	S	X	X	-	-
Butterflybush (Buddleia superba)	W5	D	L	X	X	-	-
Bush Sunflower (Encelia californica)	Z2,4,5	P-N	S	X	X	-	-
California Lilac (Ceanothus arboreus)	Z2,4	E-N	L	X	X	-	-
California Lilac (Ceanothus cyaneus)	W3; Z4	E-N	M	X	X	-	-
California Lilac (Ceanothus intergerrimus)	W2,4 Z4,5	E-N	M	-	-	X	X
California Lilac (Ceanothus spinosus)	W4; Z4,5	E-N	M	X	X	-	-
California Lilac (Ceanothus thrysiflorus)	W3,4 Z2,4	E-N	M	X	X	-	-
California Lilac (Ceanothus oliganthus)	W2; Z4	E-N	M	X	X	-	-
Cassia artemesoides	Z1,5	E	M	X	X	-	-
Cassia tomentosa	W1	E	L	X	X	-	-

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
Carpenteria californica	Z2,4	E-N	M	X	X	-	-
Carissa grandiflora - Natal Plum	Z2,4	E	S	X	X	-	-
Coffeeberry (Rhamnus californica)	Z2,4,5	E-N	M	X	X	X	X
Coffeeberry - dwarf (Rhamnus crocea)	Z2,4,5	E-N	S	X	X	-	-
Coralberry (Symphoricarpos vulgaris)	W3; Z5	D	S	X	X	X	X
Snowberry (Symphoricarpos occidentalis)	W4	D-N	M	X	X	X	X
Snowberry - dwarf (Symphoricarpos mollis)	W1,2,4	D-N	S	X	X	X	X
Creek Dogwood (Cornus californica)	W3,4	D-N	L	-	-	X	X
Cotoneaster acuminata	W5; Z5	E	M	X	X	-	-
Cotoneaster francheti	W5; Z5	E	M	X	X	-	-
Cotoneaster harroviana	W5; Z5	E	M	X	X	-	-
Cotoneaster horizontalis	W5; Z5	D	S	X	X	X	-
Cotoneaster microphylla	W5; Z5	E	S	X	X	-	-
Cotoneaster pannosa	W5; Z5	E	M	X	X	X	-
Deutzia gracilis	W5; Z5	D	S	X	X	X	X
Diosma alba - Breath of Heaven	W5	E	S	X	-	-	-
Duranta plumieri	W5; Z5	E	M	X	-	-	-
Eugenia myrtifolia - Australian Brush Cherry	W1; Z5	E	L	X	-	-	-

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
Elderberry - blue (Sambucus glauca)	W3; Z1,2, Z3,4,5	D-N	L	X	X	X	-
Flowering Ash (Fraxinus dipetala)	W3,4 Z4,5	D-N	L	-	X	X	X
Flowering Almond - dwarf	W1,5; Z5	D	L	X	X	X	X
Flowering Crabapple - dwarf	W1,5; Z5	D	L	X	X	X	X
Flowering Quince - dwarf	W1,5; Z5	D	S	X	X	X	X
Flowering Tamarix	Z1,3,5	D	M	X	X	X	-
Fremontia californica	Z2,4,5	E-N	L	X	X	-	-
Genista fragrans - Canary Island Broom	W1; Z5	E-N	M	X	X	-	-
Holly - California Toyon (Photinia arbutifolia)	W2,4 Z1,2,4,5	E-N	L	X	X	-	-
Holly-leaf Cherry (Prunus illicifolia)	W4,5 Z2,4,5	E	M	X	-	-	-
Juniper - Chinese (Juniperus chinensis pyramidalis)	W5; Z5	E	M	X	X	X	X
Juniper - Savin (Juniperus sabina)	W5; Z5	E	S	X	X	X	X
Juniper Tamarix-leaved (Juniperus sabina tamariscifolia)	W1,5; Z5	E	S	X	X	X	X
Matilija Poppy (Romneya coulteri)	Z4,5	P-N	M	X	X	X	-
Mountain Mahogany (Cercocarpus betulaefolius)	W2; Z4,5	E-N	L	X	X	X	-
Mountain Mahogany (Cercocarpus ledifolius)	W2; Z4,5	E-N	L	X	X	X	-

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
Mock Orange - California (Philadelphus lewisi)	Z2,4	D-N	M	X	X	X	-
Mock Orange - Eastern (Philadelphus coronarius)	W1,3,5	D	L	X	X	X	X
Mock Orange - Eastern (Philadelphus virginalis)	W1,3,5	D	M	X	X	X	X
Monkey Flower (Mimulus glutinosus)	Z2,4,5	E-N	S	X	X	-	-
Myrtle - Roman (Myrtus communis)	W5; Z5	E	S	X	X	-	-
Oregon Grape (Mahonia aquifolium or pinnata)	W1,2,3,4	E-N	S	X	X	X	X
Pittosporum tobira	W1,3,4,5	E	M	X	X	-	-
Pittosporum undulatum	W1,3,4,5	E	L	X	-	-	-
Plumbago capensis	Z1,5	E	S	X	-	-	-
Pyracantha crenulata	Z5	E	S	X	X	-	-
Pyracantha lalandi	Z5	E	S	X	X	-	-
Pyracantha yunnanensis	Z5	E	S	X	X	-	-
Redbud (Cercis occidentalis)	W3 Z2,4,5	E-N	L	X	X	-	-
Serviceberry (Amelanchier alnifolia)	W3 Z2,4,5	D-N	L	-	-	X	X
Snowbell Bush (Styrax officinalis var. californica)	Z2,4	D-N	M	X	X	-	-
Spiraea bumalda - Anthony Waterer	W5; Z5	D	S	X	X	X	X
Spiraea Van Houtte - Vanhoutte Spiraea	W5; Z5	D	M	X	X	X	X

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

SHRUBS	Natural Habitat	Type	Size	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
Sumac - Laurel leaf (Rhus laurina)	Z2,4,5	E-N	M	X	X	-	-
Sumac - Lemonadeberry (Rhus integrifolia)	Z1,2,4,5	E-N	M	X	X	-	-
Sumac - Sugarbush - dwarf (Rhus ovata)	Z2,5	E-N	M	X	X	-	-
Solanum xanti - Violet Nightshade	Z2,5	P-N	S	X	X	X	-
Tree Poppy (Dendromecon rigida)	Z2,4,5	P-N	M	X	X	X	-
Weigela rosea	W1,4,5	D	M	X	X	X	X

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

VINES AND GROUND COVER		Natural Habitat	Type	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
California Wild Desert Grape (Vitis girdiana)	Sh or Ps	W3,4	D-N	X	X	-	-
Creeping Myrtle (Vinca minor)	Sh	W1,2,5	E	X	X	-	-
Conolvulus mauritanicus	Su	Z5	P	X	X	-	-
Wood Strawberry (Fragaria californica)	Sh	W2,4,5 Z5	P-N	X	X	X	X
Sand Strawberry (Fragaria chiloensis)	Su	W1; Z4,5	P-N	X	X	-	-
Ice Plant - Smallleaf	Su	Z5	E	X	X	-	-
Japanese Spurge (Pachysandra terminalis)	Ps or Sh	W1,5	E	X	X	X	-
Lantana - Trailing (lavender)	Su or Sh	Z4,5	E	X	X	-	-
Lippia repens (low grass substitute)	Su or Sh	W1; Z5	P	X	X	-	-
Squaw carpet (Ceanothus prostratus)	Sh	W2,4; Z5	E	-	-	-	X
Boston Ivy (Ampelopsis veitchi)	Su or Sh	W1,5; Z5	D	X	X	X	X
Virginia Creeper (Ampelopsis quinquefolia)	Su or Sh	W1,3,5 Z5	D	X	X	X	-
English Ivy (Hedera helix)	Su or Sh	W1,2,4,5	E	X	X	-	-
Wild Honeysuckle (Lonicera subspicata)	Su or Sh	W1,2,4	E-N	X	X	-	-

DISTRICT 5

SOUTHERN CALIFORNIA
(South of Tehachapi Pass)

VINES AND GROUND COVER		Natural Habitat	Type	Elevation Belts 5-a 100 to 1500	5-b 1500 to 3000	5-c 3000 to 5000	5-d 3500 to 7500
Japanese Honeysuckle (Lonicera japonica halliana)	Su or Sh	W1,2,3, W4,5	D	X	X	X	X
Wisteria	Su or Sh	W1,2,3,4	D	X	X	X	X
Ceanothus diversifolius	Su or Sh	W4,5 Z2,4,5	E-N	X	X	-	-
Clematis, Calif.	Su or Sh	W1,2,3, W4,5	D-N	X	X	-	-

DISTRICT 6

SOUTHERN CALIFORNIA
(Semi-arid and Desert Interior)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 6-a 500 to 1000	6-b 1000 to 2000	6-c 2000 to 3000	6-d 3000 to 4000
A.A.	Arizona Ash (Fraxinus velutina)	W3,5; Z5	D-N	M	X	X	X	X
C.E.	Chinese Elm (Ulmus pumila)	Z4	D	M	X	X	X	X
E.S.	European Sycamore (Platanus orientalis)	Z5	D	L	X	X	X	X
B.G.	Balm-of-Gilead (Populus candicans)	W3	D	L	X	X	X	X
Cl.P.	Carolina Poplar (Populus deltoides carolinensis)	W3,5	D	M	X	X	X	X
L.P.	Lombardy Poplar (Populus nigra italica)	W5	D	L	X	X	X	X
B.L.	Black Locust (Robinia pseudo-acacia)	Z2	D	L	X	X	X	X
B.W.	Black Walnut (Juglans hindsi)	W3	D-N	L	X	X	X	X
F.M.	Fruitless Mulberry, Kingan	W3; Z5	D	L	X	X	X	X
J.T.	Jerusalem Thorn (Parkinsonia aculeata)	Z1,2,3	E-N	S	X	X	-	-
P.B.	Palo Blanco (Celtis reticulata)	W3; Z3,5	D-N	S	X	X	X	-
P.V.	Palo Verde (Cercidium torreyanum)	Z2,3,5	E-N	S	X	X	-	-
Msq.	Mesquite (Prosopis juliflora grandulosa)	Z2,3,5	E-N	S	X	X	-	-

DISTRICT 6

SOUTHERN CALIFORNIA
(Semi-arid and Desert Interior)

Map Symbols	TREES	Natural Habitat	Type	Size	Elevation Belts 6-a 500 to 1000	6-b 1000 to 2000	6-c 2000 to 3000	6-d 3000 to 4000
D.W.	Desert Willow (Chilipsis linearis)	Z1,2,3,5	D-N	S	X	X	-	-
A.C.	Arizona Cypress (Cupressus arizonica)	W2,5 Z2,3,5	E	M	X	X	X	-
C.J.	California Juniper (Juniperous californica)	Z2,3,5	E-N	S	X	X	-	-
Pn.P.	Pinon Pine (Pinus monophylla)	Z2,3,5	E-N	S	-	-	X	X
Pry.P	Parry Pine (Pinus quadrifolia)	Z1,2,3,5	E-N	S	-	-	-	X
C.P.	Coulter Pine (Pinus coulteri)	W2; Z2,5	E-N	L	-	-	-	X

DISTRICT 6

SOUTHERN CALIFORNIA
(Semi-arid and Desert Interior)

SHRUBS	Without Irrigation Natural Habitat	Type	Size	Elevation Belts 6-a 500 to 1000	6-b 1000 to 2000	6-c 2000 to 3000	6-d 3000 to 4000
Desert Holly (Atriplex hymenelytra)	Z1,3,5	P-N	S	X	X	-	-
Salt bush (Atriplex canescans)	Z1,3,5	P-N	M	X	X	-	-
Quailbrush (Atriplex lentiformis)	Z1,3,5 W3	P-N	L	X	X	X	-
Australian Salt bush (Atriplex semibaccata)	Z1,3,5 W3	P-N	M	X	X	-	-
Desert Peach (Prunus andersoni)	Z1,2,5	D-N	M	-	X	X	X
Redbud (Cercis occidentalis)	W3 Z2,4,5	D-N	L	X	X	X	-
Cats Claw (Acacia greggi)	Z1,2,5	D-N	M	X	X	X	-
Mountain Mahogany (Cercocarpus ledifolius)	W2; Z4,5	E-N	L	X	X	X	X
White Sage (Salvia apiana)	Z1,3,5	E-N	M	X	X	X	-
Purple Sage (Salvia leucophylla)	Z1,2,3, Z4,5	E-N	S	X	-	-	-
Black Sage (Salvia mellifera)	Z1,2,3, Z4,5	E-N	M	X	X	X	-
Desert Ragwort (Senecio douglasi)	Z1,3,4,5	E-N	M	X	X	X	-
Wild Buckwheat (Erigonum fasciculatum)	Z1,2,3, Z4,5	D-N	S	X	-	-	-
Prickly Phlox (Gilia californica)	Z1,2,5	E-N	S	X	X	-	-

DISTRICT 6

SOUTHERN CALIFORNIA
(Semi-arid and Desert Interior)

SHRUBS	Require Irrigation Natural Habitat	Type	Size	Elevation Belts 6-a 500 to 1000	6-b 1000 to 2000	6-c 2000 to 3000	6-d 3000 to 4000
Flowering Tamarix (Tamarix parviflora)	Z1,3,4,5	D	L	X	X	X	X
Flowering Locust (Robinia hispida)	Z1,4,5	D	L	X	X	X	X
Coffeeberry (Rhamnus californica var. virida)	Z2,5	E-N	L	-	-	X	X
Coffeeberry (Rhamnus californica)	Z2,4,5 W3,4,5	E-N	L	X	X	-	-
Coffeeberry (Rhamnus crocea)	Z2,4,5	E-N	S	X	X	-	-
Coralberry (Symphoricarpos vulgaris)	W3; Z5	D	S	X	X	X	X
Deutzia gracilis	W1,5; Z5	D	S	X	X	X	X
Lilac, Eastern (Syringa vulgaris)	W5	D	L	-	X	X	X
Snowball Bush (Viburnum opulus sterile)	W1,5	D	L	-	X	X	X
Spiraea bumalda (Anthony Waterer)	W5; Z5	D	S	X	X	X	X
Spiraea Van Houtte, Vanhoutte Spiraea	W5; Z5	D	M	X	X	X	X
Weigela rosea	W1,4,5	D	M	X	X	X	X
Elderberry (blue) (Sambucus glauca)	W3; Z1,2, Z3,4,5	D-N	L	X	X	X	-
Privet (for hedge) (Ligustrum ibota or vulgaris)	W1,5; Z5	D	M	X	X	X	X

DISTRICT 6

SOUTHERN CALIFORNIA
(Semi-arid and Desert Interior)

VINES AND GROUND COVER		Natural Habitat	Type	Elevation Belts 6-a 500 to 1000	6-b 1000 to 2000	6-c 2000 to 3000	6-d 3000 to 4000
Desert Grape (Vitis girdiana)	Sh	W3,4; Z5	D	X	X	X	X
Virginia Creeper (Ampelopsis quinquefolia)		W1,3,6 Z5	D	X	X	X	X
Clematis, Calif.		W1,2,3, W4,5	D	X	X	X	X
Sedum (in variety)	Su	Z1,2,4	E	X	X	-	-
Alyssum saxatile	Su	Z1,2,4	P	X	X	X	-
Japanese Honeysuckle (Lonicera japonica halliana)		W1,2,3, W4,5	D	X	X	X	X

FLOWER LISTS

(Selective lists of the most generally used flowers)

All plants listed below thrive best in Sun or Partial Shade unless marked: Su = Requires full sun. Sh = Requires shade.

Most of the cultivated plants will be hardy throughout the California Region, except at very high altitudes and in desert sections. The wild flowers should be grown in sections where they are native.

CULTIVATED FLOWERS

ANNUALS

Large - 2½ feet and over

Aster	
Cornflower or Bachelor Button	
Cosmos	
Larkspur	
Marigold, Tall French	
Marigold, Tall African	Su.
Nicotiana	
Rudbeckia	Su.
Salpiglossis	
Scabiosa	
Snapdragon	Su.
Stocks	
Sunflower	Su.
Sweet Peas	
Zinnia, Giant	Su.

Medium - 1 to 2 feet

Ageratum (Blue Perfection)	
Aster	
Calendula	
Candytuft	
Clarkia	
Dianthus	Su.
Dimorphotheca (African Daisy)	Su.
Four O'clock	
Gaillardia	Su.
Godetia	
Gypsophila (Baby's Breath)	
Linum (Scarlet Flax)	
Marigold, Dwarf French	

PERENNIALS

Large - 2½ feet and over

Anemone (Jap. Windflower)	
Dahlia	
Delphinium	
Digitalis (Foxglove)	
Geranium	
Heliopsis (Orange Sunflower)	Su.
Heliotrope	
Hollyhock	
Larkspur	
Lavender	
Lupin	
Poppy, Oriental	Su.
Salvia, Azurea and Farinacea	
Scabiosa, Caucasica	
Valerian	

Medium - 1 to 2 feet

Agathea	
Candytuft	
Cineraria	Sh.
Columbine	
Coreopsis	Su.
Daisy, Shasta	
Gaillardia	Su.
Geum	
Heuchora (Coral Bells)	Sh.
Penstemon	
Platycodon (Balloon Flower)	
Poppy, Iceland	Su.
Pyrethrum, grandiflorum	Su.
Scabiosa, columbaria	

ANNUALS		PERENNIALS	
Medium - 1 to 2 feet (cont'd)			
Mignonette		Sweet William	
Nasturtium, Dwarf		Verbena	Su.
Petunia		Veronica (Speedwell)	
Poppy, Shirley	Su.	Wallflower	
Phlox, drummond	Su.		
Snapdragon, Intermediate	Su.		
Stocks, Ten Weeks			
Viscaria (Rose-of-Heaven)			
Zinnia, Pom-pom	Su.		
Small - 6 to 12 inches			
Ageratum, Dwarf		Alyssum saxatile	
Alyssum		Arabis (Rock Cress)	
Candytuft, Dwarf		Aubrietia	
Convolvulus, Minor	Su.	Campanula, carpatica	
Godetia, Semi-Dwarf		Catnip (Nepeta mussini)	
Lobelia, compacta		Cerastium (Snow-in-Summer)	
Nemesia		Daisy, English (Bellis perennis)	
Pansy		Dianthus, plumarius	Su.
Petunia, Compact		Forget-Me-Not	
Portulaca	Su.	Primrose, polyanthus	
Sweet Peas, Cupid		Pyrethrum, Golden Feather	Su.
Virginia Stocks		Ranunculus	
Viscaria, compacta		Viola	

BULBOUS PLANTS

Agapanthus (Blue Nile Lily)	Montbretia
Anemone	Snowdrop (Galanthus)
Daffodil	Tritonia
Hyacinth	Tritoma (Red Hot Poker)
Iris, many varieties	
Lily, Calla	
Lily, Day	
Lily, Madonna	
Lily, Regal	
Lily, Tiger	
Lily-of-the-Valley	
Narcissus	
Crocus	
Freesia	
Gladiolus	
Glory-of-the-Snow (chionodoxa)	

ROCK GARDEN (Perennial) PLANTS

Achillea ptarmica (The Pearl)
Alyssum saxatile
Ameria (Irish Moss)
Arabis alpina (Rock Cress)
Arenaria (Sea Pink)
Astor, Sub-coeruleus (Michaelmas Daisy)
Coral Bells (Heuchera Sanguinera) Sh.
Candytuft, sempervirens
Candytuft, gibraltarica
Campanula, barbata
Cerastium (Snow-in-Summer)
Dianthus (Pinks)
Dianthus (Cheddar Pink)
Dianthus deltoides
Dianthus plumarius
Forget-Me-Not (Myosotis)
Lobelia, Trailing
Penstemon
Portulaca
Verbena
Succulents (including Ice Plants) and Cacti
(many species and varieties)

CALIFORNIA WILD FLOWERS

(Partial List)

ANNUALS

Large - 2½ feet and over

Argemone platyceras var. hispida
(Prickly Poppy) desert S.Calif.
Clarkia elegans (purple)
Godetia bottae
(Farewell-to-Spring)
Helianthus annus
(Wild Sunflower)
Phacelia grandiflora
(Large Flowered Phacelia)
Phacelia tanacetifolia
(Wild Heliotrope)

Medium - 1 to 2 feet

Clarkia concinna
(Red Ribbons)
Collinsia bicolor
(Innocence)
Echscholtzia californica
(California Poppy)
Gilia achillaefolia
(Blue Gilia)
Gilia densiflora (Sdy. Soil)
(California Phlox)
Godetia grandiflora
Layia elegans
(Tidy Tips)

PERENNIALS

Large - 2½ feet and over

Aguilegia truncata
(Columbine) M. Sh.
Coreopsis gigantea
(Tree Coreopsis)
Delphinium cardinale
(Scarlet Larkspur)
Delphinium parryi
(Blue Larkspur)
Lupinus arboreus
(Yellow Tree Lupine)
Lupinus brittoni
(Britton's Blue Bush Lupine)
Lupinus cytisoides
(Purple Canyon Lupine)
Lupinus longifolius
(Blue Bush Lupine)
Penstemon antirrhinoides
(Yellow Bush Penstemon)
Penstemon centranthifolius
(Scarlet Bugler)
Penstemon heterophyllus
(Violet Beard Tongue)
Penstemon spectabilis
(Giant Blue Penstemon)

Medium - 1 to 2 feet

Castilleja californica
(Indian Paint Brush)
Clintonia andrewsiana
Coreopsis maritima
(Sea Dahlia)
Dodecatheon clevelandi
(Shooting Star) S. Calif.
Linum lewisi
(Blue Flax)
Lupinua formosus
(Purple, blue or lilac Lupine)
Mimulus cardinalis Sh.
(Scarlet Monkey Flower)

ANNUALS

PERENNIALS

Medium - 1 to 2 feet (cont'd)

Lupinus densiflorus
(White or purple Lupine)
Lupinus succulentus (Hvy. Soil)
(Blue Lupine)
Phacelia campanularia
(Bell-flowered Phacelia)
Phacelia whitlavia
(Wild Canterbury Bell)
Salvia carduacea
(Thistle Sage)

Mimulus guttatus Sh.
(Yellow Monkey Flower)
Ranunculus californicus
(California Buttercup)
Iris douglasiana Sh.
(Coast Iris)
Iris hartwegi
(Sierra Iris)
Brodiaea capitata
(California Hyacinth)
Calchortus (many species)
(Mariposa Tulip)
Lilium columbianum
(Oregon Lily) N. Calif. Coast
Lilium parvum
(Small Tiger Lily) Sierra Nev. Streams
Lilium parryi
(Lemon Lily) High Mts.S.Calif.

Small - 2 to 12 inches

Abronia villosa
(Desert Sand Verbena)
Collinsia grandiflora
(Blue Collinsea)
Coreopsis douglasi
(Yellow Daisy)
Gilia dianthoides So. Cal.
(Fringed Pink)
Layia glandulosa
(White Daisy)
Lupinus nanus
(Dwarf Blue Lupine)
Malacothrix californica
(Wild Marigold)
Malacothrix glabrata
(Desert Marigold)
Mimulus fremonti
(Fremont's Monkey Flower)
Nemophila insignis
(Baby-Blue-Eyes)
Nemophila maculata
(Spotted Nemophila)
Orthocarpus purpurascens
(Owl's Clover)
Platystemon californicus
(Cream Cups)

Abronia umbellata
(Sand Verbena)
Lathyrus laetiflorus
(Wild Sweet Pea)
Dodecatheon hendersoni
(Shooting Star)
Oxalis oregana Sh.
(Redwood Sorrel) North Coast
Trillium ovatum Sh.
(Coast Trillium) North Coast
Paeonia browni
(Western Peony)
Viola pedunculata
(Yellow Pansy) So. Calif.

BIENNIALS

Dicentra orcholeuca - 3' So. Calif. Coast Mts.

Erysimum asperum - 2' dry, rocky hills and mts.
(Western Wallflower)

Erysimum capitatum - 12 in.
(Coast Wallflower)

Mentzelia laevicaulis - 3' dry stream beds to 5,000 ft.
(Blazing Star)

Oenothera hookeri - 3' sea level to 5,000 ft.
(Evening Primrose)

Oenothera trichocalyx - 12 in. sandy plains and deserts
(Desert Evening Primrose) to 4,000 ft.

APPENDIX M

TABLES OF WEIGHTS AND MEASURES

Linear Measure

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
5½ yards	= 1 rod (rd.)
320 rods	= 1 mile (mi.)
5,280 feet	= 1 mile

Surveyor's Measure

7.92 inches	= 1 link (li.)
25 links	= 1 rod
4 rods	= 100 links
100 links (66 feet)	= 1 chain
80 chains	= 1 mile

Square Measure

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)
30¼ square yards	= 1 square rod (sq. rd.)
160 square rods	= 1 acre (Ac.)
640 acres	= 1 square mile (sq. mi.)
36 square miles (6 mi. square)	= 1 township
1 acre	= 43,560 sq. ft. and if square is 208.71 ft. on each side.

Cubic Measure

1,728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)
128 cubic feet	= 1 cord
1 cord of wood	= 4 ft. wide, 8 ft. long and 4 ft. high.

Liquid Measure

1 U.S. gallon = 231 cu. in. = .134 cu. ft.
1 cu. ft. = 7.48 gallons
1 cu. ft. of water (at maximum density) weighs 62.425 lbs.
1 gal. of water weighs 8.345 lbs.

APPENDIX N

REFERENCE LIST ON LANDSCAPING AND GARDENING

* In Regional Library, U.S. Forest Service, San Francisco

General Landscaping and Gardening

* Landscape Engineering in the National Forests, by Frank A. Waugh. Forest Service pamphlet, 1918

Book of Landscape Gardening, by Frank A. Waugh 1926
"Treatise on the general principles of outdoor art, with sundry suggestions for their application in the commoner problems of gardening".

Introduction to the Study of Landscape Design, by Henry V. Hubbard and Theodora Kimball, 1927.
This book of 406 pages and 36 full page plates of examples of landscape composition from various parts of the world is modestly titled an "Introduction" but it is considered by many to be the most thorough modern treatise on landscape composition and design. It treats of landscape architecture as a fine art and contains notes on the professional practice of landscape architecture in America.

Everybody's Garden, by Walter Pritchard Eaton, 1932
"Talks on natural design and the use of simple materials."

The Story of the Garden, by Eleanour Sinclair Rohde, 1933
A history of gardens, back to ancient Egypt and Persia. Informative and full of romantic interest.

Landscape Gardening Book, by Grace Tabor.
"Wherein are set down the simple laws of beauty and utility which should guide the development of all grounds." Excellent planting lists.

Practical Landscape Gardening, by Robert B. Cridland, 1920
"The importance of careful planning, locating the house, arrangement of walks and drives, lawns and terraces, how to plant a property, laying out a flower garden, architectural features of the garden, rose gardens and hardy borders, wild gardens and rock gardens, planting plans and planting lists (Eastern U.S.A.)."

Landscaping the Home Grounds, by L. W. Ramsey, 1930
Contains practical information on how to develop a small place in an attractive manner.

* Farm Buildings, by H. E. Murdock, University of Montana, Agricultural Experiment Station, Circular No. 131, January, 1926

* Landscape Gardening in Home Beautification, by Wellington Kennedy, Mississippi Agricultural Experiment Station, Bulletin No. 267, July, 1929.

* Beautifying the Farmstead, by F. L. Mulford, Farmer's Bulletin No. 1087, U. S. D. A. Issued 1920, revised 1929.

Water Gardens and Goldfish, by R. V. Sawyer and E. H. Perkins, 1928

The Book of Water Gardening, by Peter Bissett, 1924
In addition to aquatic plants has chapters on hardy ferns, ornamental grasses and bamboos and hardy perennials for margins of streams and ponds.

Gardening in California

Gardening in California, by Sydney B. Mitchell, 1923
One of the best general books on the subject.

From a Sunset Garden, by Sydney B. Mitchell, 1932
Practical information on treatment of banks and shady places, bulbs, iris, dahlias and gladiolus, perennials, annuals, etc. Primarily for Pacific Coast.

Gardening in California, by John McLaren, 1924
General information on gardening, including propagation of plants and monthly calendar of garden work, written by the Superintendent of Golden Gate Park, San Francisco.

California Garden Flowers, by Edward J. Wickson, 1926
Also includes trees, shrubs and vines. Complete gardening guide, including monthly calendar of gardening.

California Gardens, by Eugene O. W. Murmann
"How to plant and landscape the city lot, suburban grounds, and country estate."

Patio Gardens, by Mrs. H. M. Fox, 1929
"An inspiring book for California gardens, which describes the old and new gardens of Spain, with their slow-dripping waters, balconies and ornaments, and suggests how to adapt them to New World climates and conditions."

Southern California Gardening, by E. B. Trask, 1929
"A progressive month by month program of garden activities for the novice in California gardening."

* Home Floriculture in California, by H. M. Butterfield, University of California, Agricultural Extension Service. Circular No. 53, June, 1931 (revised April, 1932).
An up-to-date and helpful booklet.

Sunset Garden Book, Sunset Magazine, San Francisco
Includes all-year calendar of bloom for shrubs, flowers, vines, etc. by Allison M. Woodman. Also articles on special types of gardens. 1932

Sunset's All Western Garden Guide, Sunset Magazine, San Francisco.
Includes horticultural "Dictionary-Encyclopedia" and "Memo-Calendar" of garden operations by months, by Allison M. Woodman. 1934

Rock Gardens

Pleasures and Problems of a Rock Garden, by Louise B. Wilder, 1928
This book contains alphabetical descriptive list of the 200 best rock plants and how to grow them.

Cactus Book, by A. D. Houghton, 1930
A standard general treatment.

* The Fantastic Clan: The Cactus Family, by J. J. Thornbor and F. Bonker, 1932
Interesting descriptions of cacti native to the Southwest, with information as to their propagation.

* Rockeries, by F. L. Mulford
U.S.D.A. Leaflet No. 90, 1932

American Alpines in the Garden, by Anderson McCully, 1931
Primarily for Pacific Coast.

* Western American Alpines, by I. N. Gabrielson, 1932
Readable discussion by a member of the Biological Survey. Many good photographs by U.S. Forest Service.

Rock Gardens and Alpine Plants, by Henri Correvon, famous Swiss botanist. 1930
One of the most complete works on the subject. Also contains information on ferns.

Plants: Identification and General Information

* Forest Trees of the Pacific Slope, by G. B. Sudworth, 1908
A very complete treatise on all the more important forest trees and many of the shrubs west of the Rockies. Well illustrated. U.S.D.A.

* Trees of California, by W. L. Jepson, 1923
A complete and interesting treatment of all native trees of this state. Life zones, forest provinces, food products, key, etc.

* Manual of Flowering Plants of California, by W. L. Jepson, 1923
Complete and technical text for identification.

* Trees and Shrubs of California Gardens, by C. F. Saunders, 1926
Expecially those not grown in the open in the East and Middle West.

* A Yosemite Flora, by Harvey Monroe Hall, 1912
Popularly written, and can be used for most of the Sierra Nevada.

Wild Flowers of the Pacific Coast, by Leslie L. Haskin. 1935
Covers Central and Northern California, Oregon, Washington and Idaho. "Flowers are grouped according to their families or natural relationships". Well illustrated.

* Wild Flowers of California, by M. E. Parsons, 1909
Helpful, well-illustrated.

* Western Wild Flowers and Their Stories, by C. F. Saunders, 1933
Interesting facts from the flower lore of the West.

* Flowers of Coast and Sierra, by E. S. Clements, 1928
Popular account of the more common and showy wild flowers. Excellent, colored plates.

* Western Wild Flowers, by Margaret Armstrong, 1915
A helpful, well-illustrated guide.

* Herbaceous Perennials, by F. L. Mulford. Issued 1924, Revised 1929. U.S.D.A. Farmer's Bulletin No. 1381.
Covers entire U.S.A. by regions with similar growing conditions.

Horticulture: General

* Cyclopedia of Horticulture, by L. H. Bailey. 3, 4, or 6 volumes.
Standard reference work.

* Hortus: A Concise Dictionary of Gardening, by L. H. Bailey and E. Z. Bailey, 1930
A one-volume reference handbook on the cultivated plants of North America.

Propagation and Care

The Nursery Manual, by L. H. Bailey, 1920
Standard book on propagating plants.

* Transplanting Trees and Shrubs, by F. L. Mulford, 1929
Farmers' Bulletin No. 1591.

* Propagation of Trees and Shrubs, by Guy E. Yerkes, U.S.D.A. Farmers' Bulletin No. 1567, 1929 & 1932.
Fruit and ornamental trees and shrubs.

The Pruning Manual, by L. H. Bailey.

* Planting and Care of Street Trees, by F. L. Mulford, 1921
Farmers' Bulletin No. 1209.

How to Grow Roses, by Robert Pyle, J. Horace McFarland and G. A. Stevens. Revised 1930
Probably the most authoritative small volume on roses in the U.S. Colored plates and half-tones.

* Pruning, by L. C. Corbett, 1903
Farmers' Bulletin No. 181.

Pruning, by W. M. Atwood
Oregon Agricultural Experiment Station, Corvallis, Oregon. Pamphlet.

* Planting and Care of Lawns, by H. L. Westover and C. R. Enlow, Oct. 1931. Bureau of Plant Industry, U.S.D.A. Farmers' Bulletin No. 1677.

Plant Diseases, Insects and other Pests

* Insects of Western North America, by E. O. Essig, 1926
Standard book by a well-known authority.

* Insects and Other Pests Attacking Agricultural Crops, by E. O. Essig and W. M. Hoskins. University of California, Agricultural Extension Service. Circular No. 87. Sept. 1934.

Injurious and Beneficial Insects of California, by E. O. Essig, 1915.
Supplement to California Commission of Horticulture Monthly Bulletin, v. 4.
Systematic account of economic species giving description and control.

Insects and Diseases of Ornamental Trees and Shrubs, by E. P. Felt and W. H. Rankin (Rural science series) 1932.
Standard book.

* Insects Injurious to Deciduous Shade Trees and Their Control, by J. Kotinsky, 1921.
Farmers' Bulletin No. 1169.

Control of Moles in Lawns, U.S.D.A. Farmers' Bulletin No. 1247.

General Construction

* Small Water Developments Handbook, Forest Service, Washington, D. C. 1935.

* Truck Trail Drainage Handbook, Forest Service, Region 5, San Francisco, Calif. 1935.

* Erosion Control on Mountain Roads, by Chas. J. Kraebel, California Forest and Range Experiment Station, Forest Service, Berkeley, Calif. 1935.

* A Septic Tank for Farm Homes, by H. L. Belton and J. P. Fairbank, Circular 82, Agricultural Extension Service, University of California. Dec. 1933.

* Rural Sanitation, by C. G. Gillespie, Chief, Bureau of Sanitary Engineering, Dept. of Public Health, State of California, Special Bulletin No. 47, June 1929.